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THIRD ANNUAL REPORT  
OF THE  
STATE BOARD OF HEALTH  
OF THE  
STATE OF MAINE,

For the Fiscal Year Ending December 31, 1887.

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AUGUSTA :  
BURLEIGH & FLYNT, PRINTERS TO THE STATE.  
1888.



## MAINE STATE BOARD OF HEALTH.

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OFFICE OF THE SECRETARY, }  
Augusta, Maine, June 28, 1888. }

*To His Excellency, Sebastian S. Marble, Governor, and the  
Honorable Executive Council:*

GENTLEMEN:—I have the honor of submitting to you the Third  
Annual Report of the State Board of Health of Maine.

Very respectfully,

A. G. YOUNG, M. D.

*Secretary.*

## MEMBERS OF THE BOARD.

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FREDERIC H. GERRISH, M. D.,	<i>President,</i>	Portland.
HON. LEWIS BARKER,		Bangor.
HON. STEPHEN J. YOUNG,		Brunswick.
O. A. HERR, M. D.,		Lewiston.
E. C. JORDAN, C. E.,		Portland.
J. O. WEBSTER, M. D.		Augusta.
A. G. YOUNG, M. D.	<i>Secretary,</i>	Augusta.

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“Man is the most precious capital of the State, and of society in general. Every individual represents a certain value. To preserve this as intact as possible to its furthest limit is not only a command of humanity, but also the duty of every community in its own interests.”

—*Prince Rudolph, at the opening of the Sanitary Congress at Vienna.*



## INTRODUCTORY.

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We again have the honor and the pleasure of presenting an Annual Report of the State Board of Health which records another, the third, year of sanitary work in the State of Maine.

If, in the establishment of a State Board of Health, the year 1885 marked the beginning of public health work, that of 1887 none the less will be an epoch for having provided for the perfection of the sanitary organization of the commonwealth by the establishment of a local board of health in every town and city, to work in unison with the State Board. To aid these local boards to organize, to instruct them in their duties, and, through them, to help the public in the solution of the many questions which are continually arising regarding public and private hygiene, has been the principal task of the State Board, and has left but little time for any other. During the year, however, it has been found possible to do something in certain of the fields in which there is peculiar need of work.

In the following pages of the Secretary's Report will be found the results of a personal examination of some of the school buildings in the State, and also the results of the first three and one half months' work in the laboratory for the chemical analysis of water. It became apparent to the board that there is a need of much work of this kind in the State; that many analyses of the public and private supplies should be made yearly, and that to accomplish this without exceeding the appropriation it would be necessary to have the work done in connection with the office of the Secretary and under his personal supervision.

Another new work gladly assumed in the Secretary's office is the issuing of the *The Sanitary Inspector*. The purpose of this publication is to diffuse a knowledge of public and personal hygiene, and to establish a medium of communication between the State board and the local boards. It is believed that, in these directions, it is doing a valuable work; yet, notwithstanding the extremely low subscription price, it is hoped to make it self-supporting, so that it will not, in the least, tax the financial resources of the board.

The reports of the local boards of health, it should be remembered, are with a few exceptions not for the entire year. The act establishing the local boards went into effect in April, and the organization of some of them was not made until some months later. But, notwithstanding that the period covered by the work of these boards is only from three or four to eight months, an examination of their reports, and a frequent official correspondence with the most of them, show that, in a majority of instances, the members have desired to fit themselves for the duties of the office, and that there has been much good work done—the beginning of a work which collectively will be of great value to the State, and gratifying to its citizens.

The functions of the local boards of health, or the lines of duty along which they may render themselves the most useful to the public, may be said to be threefold. In the first place they are in a position to act as educators, or leaders in local sanitary work, and, since we can hope for no satisfactory progress without enlisting the interest and co-operation of the people generally, this is not the least important part of their work. Through the use of the circulars and other publications of the State Board and in numberless instances from their own knowledge of sanitary matters and methods, instruction has been given where it was needed to aid in improving a condition which was offensive or dangerous to its owner or to others, or to teach how to observe the necessary precautions against the spread of contagion from an infected member of the household to other members, or to persons outside of the family.

A single instance will suffice to show the results which may come from a little teaching in this way. In one of our larger towns the sanitary condition of a certain quarter, inhabited by a foreign population, had been a reproach to the city and the source of much trouble. There had always been a high rate of mortality and of sickness in this community, largely apparently from local causes,—privy vaults were uncared for, kitchen wastes went out of the windows or doors and saturated the ground in the immediate vicinity of the dwellings or of the wells, and stagnant water was allowed to stand in dangerous proximity to the houses. The local board of health showed an interest in the welfare of these people by kindly pointing out these things, and explaining to them the inevitable result of cause and effect as between these conditions and their prevailing amount of sickness. According to a personal account by a

member of the local board, it was remarkable how great an improvement was made in the sanitary conditions at little cost, and by the voluntary labor of the people outside of their regular working hours. Vaults were cleaned, and the dry earth system put in use as far as practicable, the disposal of the kitchen slops was effected in a less objectionable manner, and ditches were dug to drain off stagnant water. The different members of the little community came to vie with one another in making sanitary improvements. They expressed their great gratitude for the help the local board had given them in showing what to do. One of them said: "Everybody else from the city has come out and damned us, but has not tried to help us. You have shown us what to do." It was said that the results of these improvements were very gratifying to the board and to the people themselves, for there was an amelioration of many of the discomforts of living, and a marked diminution in the amount of sickness during the season.

In the second place the local board of health stands as arbiters between the thoughtless or wilful committers of nuisances and their unfortunate neighbors, who are unpleasantly or injuriously affected by their doings. A glance at the reports will show that the local boards of health, particularly in the cities and villages, have found work to do and have done it well. In most instances the complaints of nuisances have been found to be well founded, and in the great majority of cases the condition or thing of which complaint has been made has been removed, where it has been found practicable to remove it. It is gratifying to learn that, both in the city where the number of these foci of discomfort and disease, which have come to the notice of the board, has mounted into the hundreds, and in the small town where only one or two complaints have been received, almost all have been removed without trouble. Most of the owners have shown a disposition to do what is right, as soon as their attention has been called to the matter.

A third work done by the local boards is the prevention and restriction of the infectious diseases. Knowing as we do the possibility of limiting their spread by means of well directed and united effort, and that, therefore, their prevalence and their ravages are in great part entirely needless, it has become recognized as ethically sound to hold the individual or the town responsible for neglect to take precautions against their diffusion. In no direction is there a more serious responsibility than as regards certain contingencies

due to the presence of infection. The man who, through motives of cupidity or self-convenience, stores nitro-glycerine or gunpowder in mass, in the midst of a populous place, and thereby suddenly sends his victims to their final account, is held accountable under the criminal law. He who throws poison into his neighbors' well is likewise accounted a criminal. And he who, knowing that he bears, or probably bears, the poison of a deadly disease in his clothing or person, and nevertheless wilfully and carelessly subjects his neighbor or his neighbor's children to the danger of death, is no less, under the moral and common law, a criminal.

Judge Dixon, of New Jersey, in a charge to the grand jury at Patterson, said: "If a man, conscious that he carries about with him the germs of a contagious disease, recklessly exposes the life and health of others, he is a public nuisance and a criminal, and may be held answerable for the results of his conduct. If death occurs through his recklessness, he may be indicted for manslaughter. It is held that where a person knowingly communicates a contagious disease to another and death results, the crime is that of manslaughter." Judge Dixon added, "the man may be indicted also for spreading the disease by conscious exposure of others thereto, by his presence in public places—such as on the streets, in halls, etc."

Among the "natural, inherent and inalienable rights," which federal and state constitutions assure us, the right to be free from the needless imposition of contagion is not the least. Therefore, to guard against the danger of the unrestricted spread of the infectious diseases, the law justly imposes certain precautionary duties upon the infectious sick, and upon the dwellers with and attendants on the sick, the most important of which are: Notification to the local board of health, isolation of the patient, placarding of the entrances of infected houses, notification to the teachers and disinfection.

First in the order of precautionary duties, the householder, where certain infectious diseases exist, and the attending physician, if one is in attendance, are required to give immediate notice to the local board of health. This is a requirement of prime importance. Without it all semblance of preventive work is largely a farce and a failure. Much to the credit of the medical profession is the fact that very generally its members have cheerfully and promptly done their part in this direction. In many of the towns it is believed that every case which has come under the notice of the attending physicians has been reported. In our largest city, Portland, the co-

operation with the local board has been particularly cordial and exemplary. For their convenience the physicians of the State are supplied with blanks, on which to report cases of the infectious diseases.

The isolation of patients sick with contagious diseases has by most of the boards been carried out in accordance with the instructions of the State board, or as seemed to them necessary for the public safety in the individual cases.

For the purpose of warning the public of danger, the practice has been quite general of placarding the entrances of infected houses. This in many places outside of our State has been found a very useful expedient for diminishing the spread of contagion. In some of our western cities there was at first some opposition to this method; but a short trial convinced the public of its practical utility and beneficence. Besides giving to the public what every person has a right to know, information of the presence of danger, the infected households are relieved of the necessity of warning each individual who approaches, and find it convenient to shift to the local board the responsibility of excluding unnecessary and unwished for visitors. Householders have sometimes expressed satisfaction with the arrangement and in one instance it was so highly appreciated that, when the patients had recovered and the house was disinfected, the owner asked as a favor that the card be permitted to remain a few days longer on the door, so that his family could have a little time to rest and recover themselves before receiving promiscuous callers.

The provisions of the law for the notification of teachers, when contagious diseases appear in their districts, and for the exclusion of pupils from infected houses are thought to have been pretty generally carried out by the local boards. A few instances have been reported in which ignorance or something worse has permitted children with scarlet fever or diphtheria to return to school in an infectious condition, and thus to work harm.

One outbreak, which suddenly prostrated five or six scholars with scarlet fever and broke up the school, was traced to a boy whose illness with that disease was not reported to the local board, and who was permitted by his parents to return to school, while yet in the period of desquamation.

The disinfection in connection with the majority of the outbreaks of infectious diseases appears to have been carried out in pretty close accord with the instructions of the State Board, though somewhat often there has been an apparent want of attention to minutiae, which are essential to success.

The best results of sanitary work cannot be attained in a single season. The perfect sanitary organization of a State must be the outgrowth of time and of the acquisition of some special knowledge and expertness on the part of the local health officials. Nevertheless, an examination of the reports of the local boards will show that, even in the first year, many of them have done work for which their own towns and the whole State should feel grateful.

During the year small-pox was imported into the State twice; first into Greenville by an Italian workman on the Canada Pacific Railway, and the second time into Gardiner, through the medium of infected rags in the paper mill. In both instances the outbreak was limited to the initial case.

Many outbreaks of diphtheria have been reported to the State Board; but, as the local reports show, most of these have been restricted to the first case or cases, or to a very few. In a few towns the disease has shown what is so often seen, when a locality is infected either by importation or by the appearance of a "sporadic" case,—a tendency to linger in the infected district and reappear again and again, until a pretty large collective mortality results. It is very certain that, in many of these prolonged outbreaks, the cause is to be looked for in the subtle nature of the infection; and when this and the need and the effectiveness of proper disinfection are generally comprehended, these discouraging experiences will not be so numerous.

During the latter part of the year, scarlet fever appeared in many towns, but, unfortunately, in most cases it assumed a mild form.

No notable outbreak of typhoid fever has occurred. The disease has, almost without exception, been restricted to the first cases or to the single family.

Unless a gross neglect of vaccination obtains, diphtheria, scarlet fever and typhoid fever, are and will continue to be diseases of more serious import to our State than the dreaded small-pox. Whether or not any of them can be completely banished, as some hopeful sanitarians have thought likely, when we get a little nearer to the hygienic millenium, it is reasonable to expect that, by the united watchfulness of towns and States, the ravages of these pestilences may be greatly diminished. When the people generally learn that it is practicable, and demand that it shall be done, outbreaks of the infectious diseases will almost always be restricted to the first cases, as they have this year in Bath, Calais and other towns.

## SECRETARY'S REPORT.

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I have the honor to present the following as the Third Annual Report of the State Board of Health. In its composition the same plan has been followed as in the two preceding reports,—to omit those minor details of work and correspondence which are of only passing interest, and to present only those subjects which are of more permanent interest and value.

The membership remains the same as when the last report was made. At the annual meeting held in March, Dr. Frederick H. Gerrish was re-elected President. Mr. E. C. Jordan, whose term of membership expired January 31, 1887, was re-appointed by the Governor to fill the vacancy thus occasioned.

The names and addresses of the members of the Board, with the dates at which their terms of office expire, are as follows :

O. A. HERR, M. D., Lewiston, term expires January 31, 1888.

HON. STEPHEN J. YOUNG, Brunswick, term expires January 31, 1889.

HON. LEWIS BARKER, Bangor, term expires January 31, 1890.

FREDERIC H. GERRISH, M. D., Portland, term expires January 31, 1891.

J. O. WEBSTER, M. D., Augusta, term expires January 31, 1892.

E. C. JORDAN, C. E., Portland, term expires January 31, 1893.

At the annual meeting in March, the following committees were appointed for the ensuing year :

On Finance—The Hon. Lewis Barker, J. O. Webster, M. D., and the Secretary.

On Disposal of Excreta—F. H. Gerrish, M. D.

On Ventilation—O. A. Herr, M. D.

On Sewerage and Drainage—E. C. Jordan, C. E.

On Water and Water Pollution—J. O. Webster, M. D.

On School-Houses and School Hygiene—A. G. Young, M. D.

On Publications—Frederic H. Gerrish, M. D., J. O. Webster, M. D., and A. G. Young, M. D.

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At the quarterly meeting in June, the Board discussed the question of the advisability of publishing a sanitary journal as the official organ of the Board, and the matter was left in the hands of a committee, consisting of Drs. Young, Horr, and Gerrish, chosen to consider the matter fully and to act as might be thought best. The objects which we had in view in proposing such a publication were to make it serve as a medium of communication between the State Board and the local boards of health, and for the diffusion among the people of hygienic knowledge and of information regarding the progress of sanitary science. After a studious examination of the question and careful estimation of the expenses of the undertaking and the probable sources of revenue which would cover these expenses, or partly cover them, the committee decided to publish the journal as a monthly, under the title of *The Sanitary Inspector*, and the first number was issued in July. The page was made of the same size as that of the annual report and of the circulars which are issued by the board for the reason that it would ensure a saving in printing. Matter set up for the journal would not have to be re-set for the circulars, and *vice versa*. The establishing of local boards of health in all the towns necessitated very frequent communications between the State Board and the local boards, and it was seen that many of these communications would be of general interest and could be sent out through the columns of the monthly publication at a considerable saving to the State in postage.

## THE ESTABLISHMENT OF LOCAL BOARDS OF HEALTH.

The following act passed by the last Legislature, was published in the Second Annual Report of this Board, but its re-publication in this connection is rendered necessary in order that the significance of the circulars and forms which are given on the succeeding pages may be more apparent.



## CHAPTER 123, LAWS OF 1887.

An Act to establish Local Boards of Health, and to protect the people of this State from Contagious Diseases.

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*Be it enacted by the Senate and House of Representatives in Legislature assembled, as follows :*

SECT. 1. There shall be a local board of health in each city and town in this State to be composed of three members, anything in the charter of such city to the contrary notwithstanding.

SECT. 2. Their appointment shall be as follows : On the second Monday in April, one thousand eight hundred and eighty-seven, the municipal officers in each town shall appoint three persons, one for three years, one for two years, and one for one year, and thereafter annually before the 15th day of April one person to serve three years, and each to hold office until another is appointed in his stead. Any vacancy arising from any cause shall be filled at the first meeting thereafter of the municipal officers. If for any reason the appointments are not made at said dates, the same shall be made as soon as may be thereafter.

SECT. 3. Before the fifteenth day of May in each year the board of health shall meet for the transaction of business and shall choose a chairman and a secretary from their number.

SECT. 4. The chairman shall preside at all meetings of the board. The secretary shall in a book kept for that purpose make and keep a record of all the proceedings at the meetings and of all transactions, doings, orders and regulations of the board of health. The secretary shall be also the executive officer of the board when a health officer is not appointed.

SECT. 5. The municipal officers may appoint a health officer who shall be a well-educated physician, who shall be the sanitary adviser and executive officer of the board, and who shall hold office during the pleasure of the board. The municipal officers shall establish his salary or other compensation and shall regulate and audit all fees and charges of persons employed by each board of health in the execution of the health laws and of their regulations.

SECT. 6. It shall be the duty of the health officer, or where there is no health officer appointed, of the secretary of each local board of health, at least once in each year, to report to the State Board of

Health, their proceedings, and such other facts required, on blanks, and in accordance with instructions received from said board. He shall also make special reports whenever required to do so by the State Board of Health. He shall, within one week following their meeting and election of officers, report to the Secretary of the State Board of Health the name and address of each member of the local board, of the chairman and secretary, and of the health officer when one is appointed.

SECT. 7. Each local board of health constituted under this act shall have power and it shall be its duty :

I. To hold regular quarterly meetings, and special meetings whenever considered necessary by its executive officer, also whenever requested by the State Board of Health, or the president and secretary thereof.

II. To prescribe the powers and duties of the local health officer, when there is one, and direct him from time to time in the performance of his duties.

III. To guard against the introduction of contagious and infectious diseases, by the exercise of proper and vigilant medical inspection and control of all persons and things coming within the limits of its jurisdiction from infected places, or which for any cause, are liable to communicate contagion ; to give public notice of infected places, by displaying red flags or by posting placards on the entrances of the premises ; to require the isolation of all persons and things that are infected with, or have been exposed to, contagious or infectious diseases, and to provide suitable places for the reception of the same ; and to furnish medical treatment and care for persons sick with such diseases who cannot otherwise be provided for ; to prohibit and prevent all intercourse and communication with, or use of, infected premises, places and things and to require, and, if necessary, to provide the means for the thorough cleansing and disinfection of the same before general intercourse therewith, or use thereof, shall be allowed. And it shall be its duty to report to the State Board of Health promptly facts which relate to infectious and epidemic diseases, and every case of small-pox, varioloid, diphtheria, and scarlet fever, occurring within the limits of its jurisdiction.

IV. To receive and examine into the nature of complaints made by any of the inhabitants concerning nuisances dangerous to life and health within the limits of its jurisdiction ; to enter upon or within any place or premises where nuisances or conditions dangerous to life

and health are known or believed to exist, and personally or by appointed agents to inspect and examine the same; and all owners, agents and occupants shall permit such sanitary examinations; and every such board of health shall have power, and it shall be its duty, to order the suppression and removal of nuisances and conditions detrimental to life and health found to exist within the limits of its jurisdiction.

V. To make, alter or amend such orders and by-laws as they shall think necessary and proper for the preservation of life and health and the successful operation of the health laws of the State, subject to the approval of any justice of the supreme judicial court. Notice shall be given by the board of health of all by-laws made or amended by them by publishing the same in some newspaper, if there is one published in such town, if there is none, then in the nearest newspaper published in the county, and a record of such publication of said orders and by-laws in the office of the town clerk shall be deemed a legal notice to all persons.

SECT. 8. Where any local board of health is of opinion that the cleansing and disinfecting of any house, building, car, vessel or vehicle, or any part thereof, and of any article therein likely to contain infection, would tend to prevent or check infectious disease, it shall be the duty of such local board of health to give notice in writing to the owner, agent, or occupier of such house, building, car, vessel or vehicle, or part thereof, requiring him to cleanse and disinfect to the satisfaction of the health officer, or board of health, such house, building, car, vessel or vehicle, and said articles within a time specified in such notice.

SECT. 9. If the person to whom notice is given fails to comply therewith, he shall be liable to a penalty of not less than five dollars and not exceeding ten dollars for every day during which he continues to make default; and the local board of health shall cause such house, building, car, vessel or vehicle, or any part thereof, and articles to be cleansed and disinfected at the expense of the town, and the town may recover the expenses so incurred from the owner, agent, or occupier in default, by act of special assumpsit.

SECT. 10. Whenever any householder knows or has reason to believe that any person within his family or household has small-pox, diphtheria, scarlet fever, cholera, typhus or typhoid fever, he shall within twenty-four hours give notice thereof to the health officer of the town in which he resides, and such notice shall be given either at

the office of the health officer or by a communication addressed to him and duly mailed within the time above specified, and in case there is no health officer, to the secretary of the local board of health either at his office or by communication as aforesaid.

SECT. 11. No householder in whose dwelling there occurs any of the above-mentioned diseases, shall permit any person suffering from any such disease, or any clothing or other property to be removed from his house, without the consent of the board, or of the health officer, or attending physician, and the said board, or health officer, or attending physician, shall prescribe the conditions of removal.

SECT. 12. No parent, guardian, or other person, shall carelessly carry about children or others affected with infectious diseases, or knowingly or wilfully introduce infectious persons into other persons' houses, or permit such children under his care, to attend any school, theatre, church or any public place.

SECT. 13. Whenever any physician knows or has reason to believe that any person whom he is called upon to visit is infected with small-pox, scarlet fever, diphtheria, typhus or typhoid fever, or cholera, such physician shall within twenty-four hours give notice thereof to the secretary of the local board of health, or the health officer of the town in which such person lives.

SECT. 14. No person affected with small-pox, scarlet fever, diphtheria, or cholera, and no person having access to any person affected with any of the said diseases shall mingle with the general public until such sanitary precautions as may be prescribed by the local board or attending physician shall have been complied with.

SECT. 15. Persons recovering from small-pox, scarlet fever, diphtheria, or cholera, and nurses who have been in attendance on any person suffering from any such disease, shall not leave the premises till they have received from the attending physician, board of health, or health officer, a certificate that they have taken such precautions, as to their persons, clothing, and all other things which they propose bringing from the premises as are necessary to insure the immunity from infection of other persons with whom they may come in contact, and no such person shall expose himself in any public place, shop, street, inn or public conveyance without having first adopted such precautions.

SECT. 16. Nurses and other attendants upon persons sick with small-pox, scarlet fever, diphtheria, or cholera, shall adopt for the disinfection and disposal of excreta, and for the disinfection of uten-

sils, bedding, clothing and other things which have been exposed to infection, such measures as may be ordered in writing by the local board of health.

SECT. 17. No person shall give, lend, transmit, sell or expose any bedding, clothing or other article likely to convey any of the above diseases, without having first taken such precautions as the local board of health may direct as necessary for removing all danger of communicating any such disease to others.

SECT. 18. Any local board of health may direct the destruction of any bedding, clothing, or other articles, which have been exposed to infection.

SECT. 19. Whenever small-pox, diphtheria, scarlet fever, or other contagious disease shall appear in a town or a school district it shall be the duty of a local board of health immediately to notify the teachers of the public schools in the neighborhood, of the fact, and it shall be the duty of all teachers and school officers when thus notified, or when otherwise they shall know or have good reason to believe that any such disease exists in any house in the neighborhood, to exclude from the school-house all children and other persons living in such infected houses or who have called or visited at such houses, until such time as the local board of health (or attending physician) shall certify that such children or other persons may safely be readmitted.

SECT. 20. When persons from houses or places which are infected with any of the diseases specified in section nineteen have entered any school-room, or when, from any other cause, the school-room has probably become infected, it shall be the teacher's duty to dismiss the school, and notify the school officers and local board of health, and no school shall be again held in such school-room until the room has been disinfected to the satisfaction of the local board of health, and it shall be the duty of the school officers and board of health to have the room disinfected as soon as possible.

SECT. 21. The board, when satisfied upon due examination that a cellar, room, tenement, or building in its town, occupied as a dwelling-place, has become, by reason of want of cleanliness, or other cause, unfit for such purpose, and a cause of sickness to the occupants or the public, may issue a notice in writing to such occupants, or the owner or his agent, or any of them, requiring the premises to be put into a proper condition as to cleanliness, or, if they see fit, requiring the occupants to quit the premises within such time as the board may

deem reasonable. If the persons so notified, or any of them, neglect or refuse to comply with the terms of the notice, the board may cause the premises to be properly cleansed at the expense of the owner, or may close up the premises, and the same shall not be again occupied as a dwelling-place until put in a proper sanitary condition. If the owner thereafter occupies or knowingly permits the same to be occupied without putting the same in a proper sanitary condition, he shall forfeit not less than ten nor more than fifty dollars.

SECT. 22. No person having small-pox, diphtheria, scarlet fever, cholera, or other disease dangerous to public health, shall enter, nor shall any person allow anyone under his charge who has any such disease to enter any conveyance without having previously notified the owner or person in charge of such conveyance of the fact of his having such disease.

SECT. 23. The owner or person in charge of any such conveyance shall not, after the entry of any person so infected into his conveyance, allow any other person to enter it without having sufficiently disinfected it under the direction of the local board of health or the supervision of the health officer.

SECT. 24. No person shall let or hire any house or room in a house in which small-pox, diphtheria, scarlet fever, cholera or typhoid fever has existed, without having caused the house and the premises used in connection therewith to be disinfected to the satisfaction of the local board of health.

SECT. 25. Any member of a local board of health, or any health officer or other person employed by the local board of health may, when obstructed in the performance of his duty, call to his assistance any constable or other person he thinks fit, and it shall be the duty of every such constable or person so called upon to render such assistance.

SECT. 26. Any person who shall wilfully violate any of the provisions of this act or of said regulations and by-laws—the penalty for which is not herein specifically provided for—and any person who shall wilfully interfere with any person or thing to prevent the execution of the provisions of this act or of said regulations and by-laws, shall be guilty of a misdemeanor; and upon conviction thereof shall be subject to a fine not more than fifty dollars, and judges of municipal and police courts, trial justices, shall have jurisdiction original and concurrent with the supreme judicial and superior courts of all offences under this act.

SECT. 27. Sections fourteen, fifteen, thirty-two and thirty-four of chapter fourteen of the Revised Statutes and all acts and parts of acts inconsistent with this act are hereby repealed. All acts and parts of acts which read "health committee" are hereby amended so as to read 'local board of health', and said chapter fourteen, sections one to thirteen inclusive, and sections sixteen to twenty-nine, inclusive, are hereby amended so as to make "municipal officers" read 'local board of health.'

SECT. 28. This act shall take effect on the second Monday in April, 1887.

[Approved March 16, 1887.]

Before the time arrived for the appointment of the local boards, the following circular was sent to the municipal officers in each town :

OFFICE OF THE STATE BOARD OF HEALTH, }  
AUGUSTA, March 29, 1887. }

*To the Municipal Officers:*

DEAR SIRs:—I take pleasure in forwarding to you with this circular, copies of "An Act to establish Local Boards of Health and to protect the People of this State from Contagious Diseases." You will notice that the law is mandatory as regards the appointment of the local board of health. "On the second Monday in April, one thousand eight hundred and eighty-seven, the municipal officers in each town *shall* appoint." etc. On the same day when this act goes into effect, the municipal officers cease to have jurisdiction as ex-officio health officers, and any local board of health, health committee, or health officers elected or appointed under former laws cease to exist as such.

The importance of having a special sanitary organization in every town in our State can hardly be over-estimated. In any town, whether there may or may not, at the present time, be conditions which need official supervision, there is the possibility at any time, of having sanitary problems presented to you, the right or wrong solution of which means the saving or the wasting of human lives.

In choosing the members to compose your local board of health the State Board would respectfully urge you to make a careful selection with reference to the special fitness of the persons to be appointed. If the appointees are persons who have already shown some interest in health matters, and have given some study in these directions, all the better; but it is thought not to be well in any town to have the members of the board of health all chosen from a single profession or calling.

When you have fulfilled the duty which is imposed upon you, will you have the goodness to hand your local board of health copies of the law

under which they have been appointed, and call their attention to the provision in Sect. 6, for the prompt report of their organization to the State Board of Health.

By direction of the State Board of Health,

A. G. YOUNG, M. D., SECRETARY.

Immediately upon receipt of information in this office of the organization of a local board of health and the name and address of its executive officer, the following circular was sent to the board:

CIRCULAR No. 32.

STATE BOARD OF HEALTH OF MAINE.

TO LOCAL BOARDS OF HEALTH.

Please find enclosed herewith copies of "An Act to establish Local Boards of Health and to Protect the People of this State from Contagious Diseases," with other papers which may be of help to you as health officers of your town. This act is a long step in the direction of supplying a great want,—the lack of efficient sanitary laws and an efficient sanitary organization for the whole State. The State Board of Health has been in existence nearly two years and the want which has been most severely felt has been the need of more specific laws, and a distinct sanitary authority in every town with which it could coöperate in the work of removing the causes of disease and especially in the restriction of the infectious diseases.

Local sanitary work must necessarily be done almost wholly by local authority, yet it is found that for the greatest measure of success the different municipal governments must work together,—must stand shoulder to shoulder with each other and with the central authority. As such central authority, the State Board of Health will always be glad to aid each local board in its work in every possible way.

In return we shall expect of the local boards a strict performance of certain essential duties, particularly the reporting to the State Board of Health of cases of the contagious diseases which occur within their jurisdictions (paragraph III, of section 7). That you may be able to do this, it will be necessary that you have the coöperation of householders and physicians, as is provided in sections 10 and 13, and for the purpose of calling attention to these requirements it would be well for you to give public notice that you shall require



compliance with these sections of the law. Copies of printed notices for this purpose will be found enclosed.

Local circumstances and conditions differ so much that the amount and character of the work which will be required of the local board of health will differ considerably among the various towns. While the character of the local sanitary work is left mostly to the judgment of the local boards, as it should be, there are certain kinds of work which in all localities will demand the prompt attention of the local health authorities. Particularly will this be true in regard to the preventive management of the dangerous contagious diseases. The infection coming from them is a serious danger in every place where there is a population to be infected. To the end that these diseases may be restricted as much as possible, it is important that there be a complete coöperation of the general public, of the local boards, and of the State Board.

In the event of the appearance of any of the infectious diseases in any town, the State Board will, upon notification, send to the secretary of the local board of health circulars giving directions for the preventive management of the diseases, and copies of these should be put into the hands of the infected families and distributed to others who may be in danger of being infected. At such times this kind of instruction is usually gladly received, and it is found that the willing coöperation of the community thus secured almost always leads to a speedy diminution in the prevalence of the malady, or its complete cessation.

Much of the work of local boards of health is necessarily expert work, and requires a certain amount of technical knowledge. This, however, is of a kind which may easily be acquired by any one, and the somewhat prolonged tenure of office of the members of the boards will be a great advantage to the communities within their jurisdiction. A few words of advice from the executive officer of the local board may show the person to whom it is given better ways of doing things, and will often be gratefully accepted. Thus while possessing authority it will not always be necessary to show it. Needless meddling with private affairs, or officiousness, will not be borne by the people, but when it is clearly the duty of the health officer to interpose his authority to protect the public, there should be no hesitation. When the people can be made to understand that a thing is for their interest or for the protection of their health it will rarely occur that they will fail to support the local board of health.

Therefore is seen the importance of the educational work which the sanitary authorities are in a position to do.

In the matter of nuisances the decision of any board of health that a condition or thing is a nuisance does not necessarily make it such. Before active steps are taken to abate a nuisance there should always be the assurance that it is such in fact, and that it can be proved to be such. A broad view should be taken in all these matters, and prudence should guide every action. While it is a duty to disturb as little as possible all legitimate business interests, it should be remembered that the interest which is of paramount importance, even from a financial point of view, is the public health.

The local board should not regard itself simply as a board to hear complaints; if it does, and always waits for them to come in before it acts, it will do but a small part of its duty. The board should try to get as accurate an idea as possible of the sanitary conditions of its district, and as far as possible anticipate evil results by removing sources of danger. If complaints are always awaited much evil will often be endured and irreparable harm will often result before action is taken.

The complaints which are sent in are a valuable source of information as regards the localities which probably the most urgently demand attention. As such, in the interest of the public health, they should be encouraged. The sources whence they come should always be kept strictly private, and the names of the informants not divulged except when necessity demands it. A private record should be kept of complaints and complainants separate from the general record which the secretary is expected to keep.

An accurate record should be kept of all the proceedings and actions of the board and of its executive officer. This will be necessary to legalize the doings of the board, and sometimes for self protection.

Blanks and papers for various purposes will soon be forwarded to every board, as will also the publications of the State Board as soon as issued.

BY ORDER OF THE STATE BOARD OF HEALTH.

A. G. YOUNG, M. D., Secretary.

With the preceding circular to the local boards, there were sent a supply of Forms 1, 2, 3, 4, 6, 7, 8, 10, 11, 12, 13, and 14, samples of which are presented on the next few pages, placards for

diphtheria and scarlet fever and copies of the annual report of the State Board and of the circulars which had already been published.

Form 1 is for the convenience of physicians and householders in reporting cases of the contagious diseases to the local boards of health. Sections 10 and 13 of the public health act were printed on the back. Copies were sent to each local board and later to every physician in the State, whose name is known to the Board.

[illegible]

Form 6 was distributed among the boards to enable them to call the attention of the public to the requirements of the law in regard to the reporting of the contagious diseases. It was printed in convenient form for posting :

[FORM 6.]

## NOTICE.

“An Act to establish Local Boards of Health and to protect the people of this State from Contagious Diseases” requires that the local board of health in each town shall promptly report cases of the infectious diseases to the State Board of Health, and further provides that householders and physicians shall within twenty-four hours give notice to the secretary of the local board of health of the existence of cases of small-pox, diphtheria, scarlet fever, cholera, typhus, and typhoid fever.

For the restriction of these diseases within the narrowest possible limits, these measures are indispensable, and as such we feel that all good citizens will be glad to give us their cordial co-operation. We therefore give notice that we shall hold to account all persons who neglect or refuse to comply with these provisions of the law.

Blank forms for reporting cases of the infectious diseases will be supplied upon application to

.....  
Secretary of Board of Health.

[FORM 3.]

## Notification of Infectious Diseases.

To the Teacher in.....

.....  
This is to notify you that.....

exists in the house of .....

on .....

You are therefore directed to exclude from your school and school-room all children and other persons living in such infected house, or who have called or visited at said house until such time as you may be notified by the Local Board of Health, or by the attending physician, that such persons may be safely re-admitted.

.....  
SECRETARY OF LOCAL BOARD OF HEALTH.

[FORM 4.]

# Certificate of Re-admission to School.

To the Teacher in .....

This is to certify that the scholars from the house of

Mr. ....

on .....

may now be re-admitted to your school, the proper precautions  
against the danger of transmitting infection having been taken.

.....  
SEC. OF LOCAL BOARD OF HEALTH.

.....188 .

The following is the form of blank which has been in use in  
reporting outbreaks of contagious diseases to the State Board :

[FORM 2.]

## Report of Outbreak of a Disease Dangerous to Public Health.

To be mailed to the Secretary of the State Board of Health, Augusta, Maine, immediately on the occurrence of a first case of small-pox, diphtheria, scarlet fever, cholera, typhus or typhoid fever, or other disease dangerous to the public health.

*To the Secretary of the State Board of Health:*

Sir,—There has come to my knowledge a case of.....  
(Name of disease.)

.....in the.....  
(Town, city or village.)

The first person sick is .....  
a....., about.....old, who was taken sick with  
(Male or female.) (Age.)

this disease on the .....day of....., 188 . The  
(Month.)

number of cases which have already occurred is.....

The danger of the spreading of the disease from or into the jurisdiction of other boards of health is.....  
(Great, not great, etc.)

for the reason that.....

Precautionary measures.....  
(Will be taken, have been taken, or are suggested to

.....as follows :.....  
to the State Board of Health, as the case may be.)

.....

Signature,.....

.....

.....  
(Whether Health Officer, or Secretary.)

....., 188 .  
(Post office address.) (Date.)

(Please fill the blank spaces in this notice if possible, but having learned the name of the disease, do not delay sending the report in order to learn other facts provided for in this blank.—A. G. Y., Sec., State Board of Health.)

Form 7 shows the blank which is used in reporting to the State Board during the prevalence of an infectious disease :

[FORM 7.]

### Weekly Report during the Prevalence of a Communicable Disease.\*

To the Secretary of the State Board of Health, Augusta, Me. :

SIR:—The following is a report of all known cases of the diseases named below in the town of.....State of Maine, during and at the close of the week ending Saturday....., 188 .  
(Date.)

Names of Diseases. †	Number of sick at last Report.	During the Week, Number.			Number sick at close of week.
		Taken sick.	Recovered.	Died.	
DIPHTHERIA .....	.....	.....	.....	.....	.....
SCARLET FEVER .....	.....	.....	.....	.....	.....
SMALL POX... ..	.....	.....	.....	.....	.....
TYPHOID FEVER.....	.....	.....	.....	.....	.....
† .....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....

REMARKS.....

.....  
.....  
.....  
.....  
.....  
.....

.....  
(Signature.)

.....  
(Health Officer or Secretary.)

.....  
(Post-office Address.)

.....  
(Date of making this report.)

\*The health officer or secretary of each local board of health in Maine is respectfully requested to forward a report on this blank to the secretary of the State Board of Health, Augusta, Maine, promptly after the close of each week during any portion of which a case of one of the diseases named in this report has been present within the jurisdiction of his board.

†Add to this list the name of such a disease as cholera, yellow fever, typhus fever, etc., whenever it occurs.

This is (?) not the last blank (Form 7) I have. Please mark out the superfluous word, if any, in the foregoing sentence.

The following is the blank which is in use in making a final report of an infectious disease after the outbreak is over.

[FORM 8.]

SPECIAL FINAL REPORT RELATIVE TO A COMMUNICABLE DISEASE.

(DO NOT FILL OUT AND RETURN THIS UNTIL OUTBREAK IS OVER.)

....., 188...

To the Secretary of the State Board of Health, Augusta, Maine.

1. The disease about which this report is made is.....  
(Name of disease.)

2. The jurisdiction of which I am.....is the  
(Health Officer or Secretary.)

.....of.....Maine.  
(Town or City.) (Name of place )

3. The source of contagion, and the mode of introduction of the disease into my jurisdiction were as follows:.....  
.....  
.....

4. The first case occurred....., 188...  
(Date of first case.)

5. The last occurred....., 188...  
(Date of last case.)

6. In this outbreak there have been.....cases in my jurisdiction.  
(Number)

7. From this disease in this outbreak there have been.....  
(Number.)

deaths in my jurisdiction.

8. At the present time there are.....cases in my jurisdiction.  
(Number )

9. The disinfectants used were: For rooms,.....; for clothing,.....; for discharges passed in the room, .....; for contents of privy-vault,.....; for bodies of the dead,.....

10. The quantity of sulphur burned was.....lbs., which was about .....lbs. per thousand cubic feet of air space.

11. The methods of disinfection were;.....  
(For clothing.)

.....  
(Discharges.)

.....  
(Rooms.)

.....  
(Contents of privy.)



12. What rooms were disinfected?.....  
 All rooms in which sickness occurred? All rooms in house? The cellar? The garret?
13. For disinfecting contents of privy, how much fresh chloride of lime was used?.....
14. What other disinfectant and how much was used in the privy vault?.....
15. Were the patients kept isolated from other people except nurse and physician? .....
16. Fully describe how you isolated the patient, and other methods you may have taken to restrict the disease. In case of small-pox, please state all facts about vaccinations .....
- .....
- .....
- .....
17. The evidences of success attending the efforts at restriction were : .....
- .....
18. Remarks. ....  
 (Please communicate any facts observed which may be of public health interest. ....
- .....
- .....

Very respectfully,

.....,  
 (Name.)

.....  
 (Health Officer or Secretary.)

The preventive management of the infectious diseases, if to be carried out with much success, requires that all cases shall be promptly reported to the local board; that there shall be a careful separation of the sick from the well until the patient has ceased to be a source of danger; that the teachers and school authorities shall be promptly notified in regard to infected families and houses; that infected pupils and persons from infected houses and places shall be excluded from the schools; and finally that the places where danger exists in the form of infection shall be indicated to the public by means of some kind of signals or warnings upon the infected houses. The local boards of health are empowered and it is made their duty "to give public notice of infected places, by displaying red flags, or by posting placards on the entrances of the premises." The displaying of the red flag has, hitherto, in this State been held to indicate the presence of small-pox or cholera, and it would be well

to reserve this form of signal for these imported scourges. A less sensational form of signal is a placard attached to the entrances of the infected houses, and this has been recommended to be used in connection with diphtheria and scarlet fever. Those sent to the local boards are printed on stout cardboard and are of somewhat larger size than this:

---

## —NOTICE.—

---

This house contains a case of  
**DIPHTHERIA.**

When the danger from contagion has  
 passed this card will be removed.

Per Order,

**BOARD OF HEALTH.**

---

**Any person removing this card without au-  
 thority is liable to a fine of Fifty Dollars.**

---

This system of placarding infected places has gone into pretty general use in the State, and to the credit of our people it may be said that, so far as known, there has been no objection made to it. On the contrary, infected families have felt the advantage of being relieved of the necessity of warning persons who approached their house, and of placarding the responsibility upon the local board of closing their doors to unnecessary visitors. It is apparent that to the general public there is a very great advantage in having the places of danger marked so that they may be known by all.

### PROTECTION OF THE SCHOOLS FROM THE INFECTIOUS DISEASES.

In our schools are found that part of our population which is in the greatest degree susceptible to the contagion of the infectious diseases; consequently the schools when not guarded are often the starting point of epidemic outbreaks. Hitherto, when such outbreaks have occurred, it has been customary to close the schools. This, of

course, entails a loss of school time to the whole school, and does not always result in diminishing the prevalence of the contagious disease. Children, of course, like company, and, out of school and idle, the children of many families do not and cannot have that careful oversight which is often required to keep them from infected houses and their vicinity, and from other children who may have mild forms of the infectious diseases, or who may have recently recovered from them and have been let out upon the street before their infectiousness has ceased, or before their period of infectiousness has been artificially shortened by disinfecting processes. The meaning of the law (chap. 123, secs. 12, 19 and 20) is that the schools shall be places which shall offer some guaranty of safety.

Upon householders, physicians, teachers and boards of health, the law imposes what is usually a trifling duty, to be done for the general welfare. Let it be done, and the school-rooms generally of our villages and cities would be safer places during the prevalence of infectious diseases than the streets and by-ways where the gregarious nature of children leads them during a vacation which is the result of an epidemic.

For the purpose of calling the attention of school officers, teachers, and the public generally to the provisions of our new public health law, and the very great need of having these provisions strictly carried out, the State Educational and the Public Health Departments together sent out the following circular :

AUGUSTA, Nov. 15, 1887.

We take this means of calling the attention of school officers and teachers to the provisions of the law in reference to the protection of the schools from contagious diseases. It is a common observation that, following the opening of the various school terms, there is often an accession of cases of the infectious diseases, which too often assume the proportions of epidemics and necessitate the closing of the schools. The principal reason for this increased prevalence of these diseases at these times, is thought to be the admission into the schools of pupils bearing infection either in their persons as the consequence of recent illness or in their clothing as the result of the omission of disinfection and other needed precautions. It is believed that a general understanding of the requirements of the law, and reasonable care in carrying them out, will affect a diminution in the amount of sickness from contagious diseases, and will prevent many interruptions of the schools which are now caused by them.

Sec. 12, Chapter 123, Laws of 1887, provides that "No parent, guardian, or other person, shall carelessly carry about children or others affected with infectious diseases, or knowingly or wilfully introduce infectious persons into other persons' houses, or permit such children under his

care, to attend any school, theatre, church or any public place." (It should be observed that "*infectious persons*" may be those who are affected with an infectious disease or those who bear the infection in their clothing.)

Sections 10 and 13 make it the duty of householders and physicians to report within twenty four hours cases of small-pox, diphtheria, scarlet fever, cholera, typhus or typhoid fever.

Sections 19 and 20 read as follows :

SECT. 19. Whenever small-pox, diphtheria, scarlet fever, or other contagious disease shall appear in a town or school district it shall be the duty of the local board of health immediately to notify the teachers of the public schools in the neighborhood, of the fact, and it shall be the duty of all teachers and school officers when thus notified, or when otherwise they shall know or have good reason to believe that any such disease exists in any house in the neighborhood, to exclude from the school-house all children and other persons living in such infected houses or who have called or visited at such houses, until such time as the local board of health (or attending physician) shall certify that such children or other persons may safely be readmitted.

SECT. 20. When persons from houses or places which are infected with any of the diseases specified in section nineteen have entered any school-room, or when, from any other cause, the school-room has probably become infected, it shall be the teacher's duty to dismiss the school, and notify the school officers and local board of health, and no school shall be again held in such school-room until the room has been disinfected to the satisfaction of the local board of health, and it shall be the duty of the school officers and board of health to have the room disinfected as soon as possible.

It will be observed that the law requires a prompt notification of cases of the infectious diseases to be sent to the local board; that it is made the duty of the local boards "immediately to notify the teachers of the public schools;" that the teachers are empowered and it is made their duty in conjunction with the school officers to exclude from the school children and other persons from infected houses; that if, in spite of these precautions, the teacher believes that the school-room has become infected, it becomes his duty to dismiss the school and notify the school officers and local board of health; and that when thus notified it is the duty of the school officers and board of health to disinfect the room as soon as possible, and usually this can be done within twenty-four hours.

Every citizen who cares for the well being of his community and State, should be willing to observe those precautions which are required to prevent the spread of the infectious diseases, and physicians, teachers, school officers and local boards of health, by working together as the law requires may do a good work in a much needed direction.

N. A. LUCE,

*State Supt. Com. Schools.*

A. G. YOUNG,

*Sec'y State Board of Health.*

## BY-LAWS.

Section 7, chapter 123 of the Laws of 1887, provides that "Each local board of health constituted under this act shall have power and it shall be its duty: V. To make, alter or amend such orders and by-laws as they shall think necessary and proper for the preservation of life and health and the successful operation of the health laws of the State, subject to the approval of any justice of the supreme judicial court. Notice shall be given by the board of health of all by-laws made or amended by them by publishing the same in some newspaper, if there is one published in such town, if there is none, then in the nearest newspaper published in the county, and a record of such publication of said orders and by-laws in the office of the town clerk shall be deemed a legal notice to all persons."

This is plainly obligatory upon the local boards to make by-laws for their respective towns only so far as in their opinion such local law making may be required. If, in their opinion, for the preservation of life and health, it is necessary and proper to make none, inaction in this direction is perfectly right and no default of duty.

To guard against undue haste in adopting by-laws, the following advisory circular was sent out:

## CIRCULAR No. 33.

## MAINE STATE BOARD OF HEALTH.

## TO LOCAL BOARDS OF HEALTH, REGARDING BY-LAWS.

Numerous enquiries have been received in this office in regard to making local sanitary by-laws. A copy of "Rules and Regulations for Local Boards of Health," which was issued by this Board two years ago, is mailed to you, but our present law in many directions is not so defective as it was then, and it is thought that fairly good local sanitary work may be done at first without supplementary by-laws. While it is certain that you will, after a while, find it necessary to regulate, by means of by-laws, some matters of which the statutory law does not specifically enough take cognizance, it is thought inexpedient to be in haste in making them. After a little experience in sanitary work, the special needs of each town will be more clearly understood by its local board.

It is desirable, in the first place, that the attention of the people be called to the requirements of our present statutory regulations, and

that they be led to willingly observe those sanitary rules which are therein laid down for the greatest good of the greatest number. A good public health law is an excellent educator of the people in sanitary matters, but it is not best to give too many or too long lessons all at once.

BY ORDER OF THE STATE BOARD OF HEALTH.

A. G. YOUNG, M. D.,

Secretary.

As was feared, there was a misunderstanding with some of the boards in regard to this matter and a number of codes of local by-laws had been submitted to the judges for approval. To furnish a guide to the local boards in regard to the points which would the most frequently need to be covered by by-laws, at the suggestion of Chief Justice John A. Peters, the following circular was sent out after having been submitted to all the members of the Supreme Judicial Court for suggestions and criticism :

## MAINE STATE BOARD OF HEALTH.

### CIRCULAR NO. 39—BY-LAWS.

The following set of model by-laws is presented to the local boards of health, not with the expectation or the wish that they be adopted in full by any board, but as offering a suitable form and as suggesting the principal points which the various boards may sometime find it necessary to include in their by-laws.

Section one, concerning the funerals of persons who have died of the contagious diseases, supplies a want which is not provided for in the statutory law. As such it is suggested that it be made a by-law in every town. Further than this it is recommended that no sections be adopted until the actual need of them has been felt by the local board.

By order of the State Board of Health,

A. G. Young, M. D.,

Secretary.

*Town of*.....

### BY-LAWS OF THE BOARD OF HEALTH

of the town of..... Me.

Adopted ..... 188 .

Approved by..... one of the  
Justices of the Supreme Judicial Court.

1. A public funeral shall not be held for any person who has died of scarlet fever, diphtheria, small-pox, cholera or typhus fever ; and the body of any person who has died of any of these diseases shall neither be brought within nor carried without the jurisdiction of this board without permission in writing from the board, nor shall there be a dis-interment of any such body after it has once been buried, without the written permission of the board.

2. No dead animal shall, within the jurisdiction of this board, be put into any river, well, spring, cistern, reservoir, stream or pond.

3. The collection of refuse matter in or around the immediate vicinity of any dwelling house or place of business, such as swill, waste of meat, fish or shells, bones, decaying vegetables, dead carcasses, excrement, or any kind of offal that may decompose and generate disease germs or unhealthy gases, and thus affect the purity of the air, shall be considered the worst kind of nuisance, and must be removed or disposed of either by burial, burning or otherwise, and in such manner that it may not be offensive to the neighborhood wherever located.

4. No privy vault, cess-pool, or reservoir, into which a privy, water-closet, stable, or sink is drained, except it is water tight, shall be established or permitted within one hundred feet of any well, spring, or other source of water used for drinking or culinary purposes.

5. All privy vaults, cess-pools, or reservoirs named shall be cleaned out twice a year, once in the spring, not later than the 15th of May, and once in the autumn, not earlier than the 15th of October.

6. Earth privies and earth closets, with no vault below the surface of the ground, shall be excepted in 5 ; but sufficient dry earth or coal ashes must be used daily to absorb all the fluid part of the deposit, and the entire contents must be removed at least monthly.

7. All sewer drains that pass within fifty feet of any source of water used for drinking or culinary purposes shall be water tight, and in sandy soil the limit shall be eighty feet.

8. Swine shall be kept in such place and manner as not to be offensive to the persons residing in the vicinity ; and their pens and yards must be kept deodorized by the application of dried muck, dry earth, or some other effective absorbent. The same rule, with regard to deodorization, applies to horses, cows, and other stock.

## Chap. 123, Public Laws of 1887.

Sec. 26. Any person who shall wilfully violate any of the provisions of this act or of said regulations and by-laws the penalty for which is not herein specifically provided for, and any person who shall wilfully interfere with any person or thing to prevent the execution of the provisions of this act or of said regulations and by-laws, shall be guilty of a misdemeanor and upon conviction thereof shall be subject to a fine not more than fifty dollars.

..... } *Board*  
 ..... } *of*  
 ..... } *Health.*

CIRCULAR No. 35.

## MAINE STATE BOARD OF HEALTH.]

## ON THE MANAGEMENT OF CERTAIN NUISANCES.

In the work of the local boards of health the judicious treatment of the various questions which come up under the head of nuisances will call for a variety of qualifications. Sometimes a detailed investigation and considerable special knowledge of sanitary matters will be required that justice may be done to the individuals and the public whose interests are involved. In the great majority of cases, however, a rapid personal examination, even by one who makes no claim to special knowledge, will lead to a just decision in regard to the matter or thing complained of, and as far as voluntary work is concerned, it would be better for the boards to confine themselves pretty closely, especially in their earlier work, to this unquestionable class of cases. By so doing, they will have the moral support of the public, and it is believed that they will be able to effect a larger measure of good with fewer possibilities of harm.

Before any summary action is taken for the purpose of causing the abatement of a nuisance, the thing or place of which complaint is made should be inspected and examined either by the board, its executive officer, or its appointed agents. If, as the result of this inspection and examination, the thing or condition under consideration is decided to be a nuisance, the board has power and it is its duty to order its removal. A notice to this effect may be sent by filling out and sending the following form :



(Form 10.)

## Office of BOARD OF HEALTH.

Of.....  
 ..... 188 .

Sir:

You are hereby notified that there are upon your premises.....  
 conditions detrimental to life and health by reason of the following:.....  
 .....

We trust you will see that it is for your interest to give this matter your early attention  
 and, by so doing, save yourself any further trouble or annoyance.

Respectfully,

.....  
 Secretary of Local Board of Health.  
 (or Health Officer.)

To.....

This form, being more courteous in tone, will not be so distasteful to the recipient, and therefore, in the cases where it is applicable, will always be preferable, as a first notice to Form 11, Form 12, or Form 13.

If the removal of the condition which is dangerous to health should not admit of delay, or if, after the receipt of this first notice, the nuisance is not removed within the specified time, a notice should be sent to the person in default, in accordance with authority conferred upon the board in Sec. 8 or Sec. 21.

When the board of health is of opinion that the cleansing or disinfecting of any house, building, etc., will tend to prevent or check infectious disease, it becomes the duty of the board to give notice in writing to the owner, agent or occupier, and this may be done by filling out and delivering a blank like Form 11.

(Form 11.)

## Office of BOARD OF HEALTH.

Of.....  
 ..... 188 .

Sir:

You are hereby notified that in our opinion the cleansing and disinfecting of your premises..... will tend to prevent or check infectious disease and you are hereby required within..... hours to cleanse and disinfect said premises in the following manner to the satisfaction of the health officer or board of health of this town:

Respectfully,

..... } Board  
 ..... of  
 ..... Health.

To.....

If the person to whom this second notice is given fails to comply therewith, there will in many cases be two lines of procedure for the board. It can either cause such house, building, etc., to be cleansed and disinfected at the expense of the town, and collect the penalty of the person in default, as provided in Sec. 9, or a third notice may be issued in accordance with Sec. 21.

As the public welfare should be the end in view, rather than litigation and the exaction of fines and penalties, Sec. 21 will undoubtedly be found the part of our law which in many cases it will be most expedient to work under, particularly at this stage.

If, therefore, nothing has been done before the expiration of the time specified in Form 11, the following notice may be sent by the secretary of the board or the health officer :

(Form 12 )

Office of BOARD OF HEALTH.

Of .....

.....188 .

Sir:

Unless your premises..... are put in a proper sanitary condition within..... days, this board will feel compelled to order them vacated.

Very respectfully,

.....

Secretary of Board of Health.

(Or Health Officer.)

To.....

If no notice is taken of this, the full board, or a majority of its members, should make a personal examination of the premises in default and issue a notice in accordance with Form 13.

(Form 13.)

Office of BOARD OF HEALTH.

Of.....

.....188 .

Sir:

The Board of Health being satisfied upon due examination that the..... occupied by you as a dwelling-place has become by reason of.....

.....

unfit for such purpose, and a cause of sickness to the occupants or the public, you are hereby notified and required to put said premises into a proper condition as to cleanliness, or otherwise to quit said premises within..... days from the date of service of this notice on you, in obedience to chapter 123, section 21, laws of 1887.

..... } Board  
..... } of  
..... } Health.

To.....

On the premises.

If it is found at the end of the time specified in Form 13, that the house has not been vacated, or the sanitary defects have not been remedied, the board should cause the house to be vacated as directed in chapter 123, section 21, laws of 1887, and at the same time a notice in accordance with Form 14 should be sent to the owner.

(Form 14.)

Office of BOARD OF HEALTH.

Of.....  
.....188 .

Sir:

Your premises.....  
having been unfit for habitation by reason of.....  
.....  
we have caused the said premises to be vacated; and you are hereby ordered not to allow them to be occupied again without permission from this board

Yours respectfully,

.....  
Secretary of Board of Health  
(Or Health Officer.)

To .....

In many cases it will probably be well to follow the routine which is herein laid down, but again in many cases it will be necessary to abbreviate it very much. In the case of needed disinfection, it should be secured without delay by means of Form 11, when any formal notice is needed. In other cases the board will deem it expedient or more proper to make use of only Forms 10, 12 and 13, or very rarely to omit Form 10.

Especially in the smaller towns much of the work of this kind may be done without any show of legal formality. If a neighborly conference with a fellow-townsmen who is in default in his sanitary arrangements will lead him to make the necessary changes, this should be considered the most satisfactory method.

CIRCULAR No. 40.

STATE BOARD OF HEALTH.

PLUMBING AND HOUSE DRAINAGE REGULATIONS.

The following Plumbing and House Drainage Regulations have been prepared to meet the needs of the cities and larger towns of the State, especially of those towns where a public water supply has been or may be introduced. The board considers it of vital importance that

such regulations be adopted and rigidly enforced in all places of any considerable size. Where needed they should be made by-laws of the city or town, after their approval by a justice of the supreme judicial court, and their publication in accordance with Chap. 123, Sec. 7, V, Laws of 1887.

By order of the State Board of Health.

A. G. YOUNG, M. D., Secretary.

1. Before proceeding to construct any portion of the drainage system of a building, the owner, builder or person constructing the same shall file with the Board of Health a plan thereof showing the whole drainage system, from its connection with the common sewer to its terminus in the house, together with the location and sizes of all branches, traps, ventilating pipes and fixtures; and no such work shall be done in any building without the approval of said Board of Health. (Health Officer or Inspector.)

2. The sewage from each building on every street provided with a common sewer shall be conducted into said sewer; and, if such sewer is not provided, the sewage shall be disposed of in a manner satisfactory to the Board of Health. (Health Officer or Inspector.)

3. That portion of the house drain which is outside of the building and more than five feet from the foundation walls shall be constructed of iron pipe or salt glazed vitrified drain pipe.

4. That portion of the drain-pipe within the building, and outside within five feet of the foundation walls, together with the soil pipe, shall be constructed of cast iron with leaded joints, or of wrought iron with screw couplings. The waste pipe connected with the conductors from the roofs and other pipes inside the building, or outside and within five feet of the foundation walls, shall be constructed of iron with leaded joints, or screw couplings.

5. The house drain and other pipes for the conveyance of sewage shall be laid with uniform grade and with a fall of not less than one inch in four feet, except in those cases where the Board of Health may permit otherwise.

6. The main house drain shall be provided with a trap, which shall be located just outside or just inside the house walls and beyond all house connections. All pipes connecting a water-closet with a soil pipe shall be trapped, each separately, and close to the connection with each water-closet. All waste pipes shall be trapped, each sepa-

ately, and close to the connections with each bath, sink, bowl, set of tubs, or other fixture.

7. All soil pipes shall be carried at their full size through and at least two feet above the roof and left open. A provision shall also be made for admitting air to the house-drain side of the main trap.

8. The joints in the vitrified pipe shall be carefully cemented, under and around the pipe, and the joints in the cast iron pipe shall be run and calked with lead. Connection of lead pipes with iron pipes shall be made with brass ferules properly soldered and calked to the iron.

9. All changes in direction shall be made with curved pipes, and all connections shall be made with Y branch pipes. All joints and pipes shall be made air-tight. The whole work shall be done by skillful mechanics in a thorough and workmanlike manner, and satisfactorily to the Board of Health. (Health Officer or Inspector.)

10. All drains now built shall be reconstructed, whenever in the opinion of the Board of Health it may be necessary.

## MAINE STATE BOARD OF HEALTH.

### CIRCULAR NO. 38—DISINFECTANTS.

It is desirable that the following revised list of disinfecting solutions and methods of disinfection be used in preference to any others which have been published by this Board. Experimentally it is found that the agents herein recommended are the most efficient as destroyers of the infection of the contagious diseases, while certain others which are omitted from this list are not so trustworthy as disinfectants, though as deodorizers or antiseptics they may be of value.

Corrosive sublimate as a disinfectant is remarkably prompt and effective in its action for most purposes, but its highly poisonous nature requires it to be used only under careful and intelligent supervision. Its solutions must be kept in glass, earthen, or wooden ware, and not in metallic vessels; neither must it be passed through leaden drain pipes, as it rapidly corrodes them.

Chloride of lime is very effective and for popular use has the advantage of being perfectly safe. This and the corrosive sublimate are much cheaper than any proprietary disinfectants and are much more trustworthy.

Disinfection cannot take the place of cleanliness or of ventilation.

#### SOLUTION A.

Chloride of Lime,	6 ounces.
Water,	1 gallon.

Mix. Cost, about three cents, or seventy-five cents a barrel This is about a three per cent solution.

#### SOLUTION B. "*Purple Solution.*"

Corrosive Sublimate,	2 drachms.
Permanganate of Potash,	2 drachms.
Water,	1 gallon.

Mix and dissolve. Label, *Poison!* Cost, two or three cents a gallon, when the chemicals are bought by the pound.

The permanganate of potassium in this solution is used to give it color as a precaution against mistakes. It also, in this quantity, increases the deodorizing qualities of the solution. This is approximately a 1 : 500 solution of the sublimate; therefore mixed with an equal quantity of water or liquids to be disinfected it gives us a 1 : 1000 mixture. One ounce of this solution contains very nearly one grain of the corrosive sublimate.

#### SOLUTION C. "*Blue Solution.*"

Corrosive Sublimate,	4 ounces.
Sulphate of Copper,	1 pound.
Water,	1 gallon.

Mix and dissolve. Label, *Poison!*

This is sixteen times stronger than Solution B and is intended as a standard solution, from which, by dilution with water, a solution of the proper strength for use may be made. To make from it a solution of the proportion of

- 1 : 500, add 8 ozs. to 1 gallon of water.
- 1 : 1000, add 4 ozs. to 1 gallon of water.
- 1 : 2000, add 2 ozs. to 1 gallon of water.
- 1 : 4000, add 1 oz. to 1 gallon of water.

#### SOLUTION D.

Labarraque's Solution,	1 pint.
Water,	1 gallon.

Mix. Cost, about twenty-five cents.

## SOLUTION E.

Carbolic acid,	7 ounces.*
Water,	1 gallon.

Mix. This is approximately a five per cent solution, or in the proportion of 1 : 21.

*Sulphur Fumigation.* To use this effectively three pounds of sulphur should be burned in a room ten feet square. Every opening into the room, flues, doors, windows, cracks and crevices, must be closed, except the door by which the disinfector is to escape. The sulphur is to be burned in an iron kettle or other vessel set in a tub containing a little water to guard against fire. Ignite the sulphur with a few live coals or with a little alcohol or kerosene and a match. Leave the room quickly, for the fumes are highly poisonous when breathed, and close the door tightly. Let the room remain closed twenty-four hours or more. Then air thoroughly for several days.

*Boiling* for at least half an hour is a sure way to destroy infection. Immersion in Sol. C, (from two to four ounces of Sol. C in one gallon of water) or in Sol. E, one-half strength, will lessen the danger from infected clothing until it can be boiled.

The foregoing agents may be applied to disinfecting purposes as follows :

*For Excreta.* 1. In the sick-room, Sol. A., or Sol. B., a quantity greater than that of the matter to be disinfected.

2. In privy vaults, Sol. A., Sol. B., or chloride of lime in powder.

*For clothing.* 1. Destruction by fire, if of little value.

2. Boiling for at least half an hour. 3. Immersion in solution of corrosive sublimate, of the strength of 1 : 2,000 for four hours (Sol. C., 2 ozs. to one gallon of water). 4. Immersion in Sol. E., one-half strength, for four hours and then boiling. 5. Articles of silk or wool which would be injured by boiling or by disinfectant solutions should be subjected to sulphur fumigation for at least twelve hours, the clothing being freely exposed.

*For Furniture, Woodwork, etc.* Washing thoroughly in Sol. B., one-half strength, or Sol. C., four ounces in one gallon of water, or in Sol. A.

\*Seven ounces of the 90 per cent carbolic acid.

*For the Person.* Sol. D. or Sol. E., one-half strength. Sol. C, (1:1000) may be used for the hands or a limited area, but not for the entire surface of the body.

*For the Dead.* Envelop the body in a sheet thoroughly saturated with Sol. C (1:1000) or Sol. A.

*For the Sick-Room.* While occupied, wash all surfaces with 1. Sol. A. and water mixed half and half. 2. Sol. B., with water half and half, or Sol. C. four ounces to one gallon of water. When vacated, use sulphur fumigation as directed in the foregoing; then wash all surfaces with Sol. A., or Sol. B., one-half strength, and afterwards with soap and hot water; finally throw open doors and windows, and ventilate thoroughly.

[FORM 44.]

## DIPHTHERIA.

ITS PREVENTION AND RESTRICTION.—[REVISED EDITION.]

ISSUED BY THE STATE BOARD OF HEALTH OF MAINE.

Diphtheria is a contagious and infectious disease, attacking persons of all ages, but affecting children much more frequently than it does adults. It may be communicated from the sick to the well by means of persons, cups or other articles which pass from mouth to mouth, or through the medium of the air, or it may be spread by means of clothing.

So generally is diphtheria regarded as due to unsanitary conditions, that by common consent it is classed among the "filth diseases;" and when we find it arising apparently independently of sources of infection, spontaneously as it would seem, we may be pretty sure that something is wrong in the health conditions of the home where it is found.

The unsanitary conditions which seem to give rise to diphtheria may be in the direction of the food or water supply; the well may be too near the privy or cess-pool, or sink drain, or barnyard, and be polluted by soakage through the filthy soil; or the something wrong may be in the direction of the air supply; the sleeping rooms and living rooms are perhaps not ventilated, and the air is re-breathed and poisoned, or a wet and foul cellar is under the house, or sewer gas goes into the rooms from defective water-closets or other fixtures, or from sink drains, or privies, or cess-pools.



When once diphtheria has arisen, the law of simple contagion carries it to the rich and the poor, to the cleanly and the uncleanly, but not to all alike. Filth invites disease and gives its germs the most congenial soil in which to develop into pestilence; but cleanliness offers only barren ground for their development.

**Diphtheria is a preventable disease.** Proper preventive measures are almost invariably followed by the limitation of the disease to the first case or cases. **When diphtheria gets away from the primary cases and makes its escape upon the community, somebody is to blame.** The sooner we accept this as a sanitary maxim, the sooner we shall begin to do our duty as individuals and as communities.

### PREVENTION.

Keep away from the sources of the contagion. Do not go where the disease is, if you can help it; and, above all, do not let your children go where it is. Permit no one to come to your home who has been where it is.

From the dwelling and its vicinity banish all sources of filth, whether of the ground, of the water, or of the air. The ground under and around the house, if not naturally dry, should be thoroughly and deeply drained.

Diphtheria does not come from far through the air, therefore do not shut up your house tightly, thinking thereby to shut out the disease. By so doing you shut *in* the poison of re-breathed air, which paves the way and makes it easy for the poison of diphtheria to claim your children. Let the sunshine in by day and the pure air both by day and night. When diphtheria is prevalent, avoid all crowded gathering; especially keep children from such places.

What is apparently only a common sore throat in adults will sometimes give rise to an outbreak of diphtheria in children; therefore, in all cases of sore throat, prudence would dictate caution in using dishes which the patients have used. A kiss to a child under these circumstances may be the unconscious seal of the little one's death warrant.

When diphtheria is rife, keep from the children gum, jewsharpes, harmonicas and other things which go from mouth to mouth.

Be sure that the drinking water and the milk are pure.

## RESTRICTION.

As soon as it is found that a person has diphtheria, he should immediately be separated from the rest of the family and put into a sunny and well ventilated room, preferably on the upper floor, and as disconnected as possible from other rooms, especially the living and sleeping rooms of children.

Before moving the patient into the room, all needless articles, such as carpets, contents of wardrobes, etc., which would catch the infection, should be removed.

No other person besides the nurse and necessary attendants should be permitted in the room, and they should take special precautions not to carry the infection. Their communication with the rest of the family should be as restricted as possible.

The secretary of the local board of health, or the health officer, should immediately be notified and should co-operate with the physician to keep the disease from spreading. Children and parents from other houses should be warned; and, if they needlessly and obstinately persist in coming, they should be driven away.

Neither the nurse nor any other person should eat or drink anything in the sick room or anything which has been there. Food which the patient has left should be burned.

Cats and dogs should be kept from the sick chamber, or better, out of the house, for their fur can easily carry the infection. These animals, as well as some others, sometimes have diphtheria, and communicate it to children.

The dishes which the patient uses should not be used by others, or washed with other dishes. They should be washed by themselves in boiling-hot water.

The utmost care must be taken that the discharges from the mouth, throat and nose do not soil the room or its furnishings. These discharges should be received on pieces of cloth and then burned. If this cannot be done they should be thoroughly disinfected with Solution C (four ounces to a gallon of water) or Solution E, followed by boiling. (See page 4.)

The discharges from the kidneys and bowels should be liberally treated with Solution A, Solution B or Solution C, and not poured into the privy-vault, but buried, if possible, 200 feet or more from dwelling-houses and water supply.

The bed-and-body-clothing should not be mixed with the family wash, but should be put into a tubful of Solution C (1:2000) or Solution E, until ready to boil.

No person from a house where there is diphtheria should go into public assemblies, such as schools, churches, or concerts.

Persons who have had diphtheria should not mingle with the public for some time after the last trace of the disease has left the throat and nose, and then not until they and all their clothing have been thoroughly washed and disinfected.

In case of death the body should be enclosed in a sheet thoroughly wet in Solution A, Solution C (eight ounces to the gallon of water) or Solution E, and put into a tight coffin, which should not afterward be opened. The funeral should be strictly private, and in no case should children be permitted to be present.

When the room is vacated after recovery or death, disinfect it by using the sulphur fumigation (See page 4); then wash all surfaces with Solution A, Solution B, one-half strength, or with Solution C (four ounces to one gallon of water), and afterwards with soap and hot water; finally throw open the doors and windows, and ventilate thoroughly.

## DISINFECTANTS.

SOLUTION A.—For excreta, privy vault, woodwork and other surfaces.

SOLUTION B.—For excreta, privy vaults.

SOLUTION C.—For clothing, the hands, excreta, vaults, furniture and woodwork.

SOLUTION D.—For the person, the hands.

SOLUTION E.—For clothing, the hands, the person, excreta.

BOILING.—For clothing.—SULPHUR FUMIGATION.—For use only where liquid disinfectants cannot be used or to supplement other methods.

### SOLUTION A.

Chloride of Lime,	6 ounces.
Water,	1 gallon.

Mix. Cost about three cents, or seventy-five cents a barrel. (Decolorizes and destroys fabrics.)

### SOLUTION B. "*Purple Solution.*"

Corrosive Sublimate,	2 drachms.
Permanganate of Potash,	2 drachms.
Water,	1 gallon.

Mix and dissolve. Label, *Poison!* Cost, two or three cents a gallon, when the chemicals are bought by the pound. (Stains fabrics, etc.)

The permanganate of potassium in this solution is used to give it color as a precaution against mistakes. It also, in this quantity, increases the deodorizing qualities of the solution. This is approximately a 1:500 solution of the sublimate; therefore, mixed with an equal quantity of water or liquids to be disinfected, it gives us a 1:1000 mixture. One ounce of this solution contains very nearly one grain of the corrosive sublimate.

SOLUTION C. "*Blue Solution.*"

Corrosive Sublimate,	4 ounces.
Sulphate of Copper,	1 pound.
Water,	1 gallon.

Mix and dissolve. Label, *Poison!*

This is sixteen times stronger than solution B, and is intended as a standard solution from which, by dilution with water, a solution of the proper strength for use may be made. To make from it a solution of the proportion of

1:500, add 8 ozs. to 1 gallon of water.

1:1000, add 4 ozs. to 1 gallon of water.

1:2000, add 2 ozs. to 1 gallon of water.

## SOLUTION D.

Labarraque's Solution,	1 pint.
Water,	1 gallon.

Mix. Cost about twenty-five cents.

## SOLUTION E.

Carbolic Acid, (90 per cent.)	7 ounces.
Water,	1 gallon.

Mix. This is approximately a five per cent. solution, or in the proportion of 1:21.

*Sulphur Fumigation.* To use this effectively three pounds of sulphur should be burned in a room ten feet square. Every opening into the room, flues, doors, windows cracks and crevices, must be closed, except the door by which the disinfectant is to escape. The sulphur is to be burned in an iron kettle or other vessel set in a tub containing a little water to guard against fire. Ignite the sulphur with a few live coals or with a little alcohol or kerosene and a match. Leave the room quickly, for the fumes are highly poisonous when breathed, and close the door tightly. Let the room remain closed twenty-four hours or more. Then air thoroughly for several days.

*Boiling* for at least half an hour is a sure way to destroy infection. Immersion in Solution C (1:2000) or in Solution E, one-half strength, will lessen the danger from infected clothing until it can be boiled.

[FORM 45.]

## SCARLET FEVER.

## ITS PREVENTION AND RESTRICTION.—(REVISED EDITION.)

ISSUED BY THE STATE BOARD OF HEALTH OF MAINE.

Scarlet Fever, Scarlatina, Scarlet Rash and Canker Rash are several names for one and the same disease. It is very desirable that only the name Scarlet Fever should be in general use, for so many names have wrought much confusion in the popular mind. Sometimes in scarlet fever the fever is high, sometimes mild. Sometimes the eruption is a vivid red rash, sometimes it is barely perceptible. Sometimes the inflammation of the throat is very malignant, sometimes so slight as not to be noticeable. No matter how these manifestations of the disease may vary in different cases, it is all scarlet fever, and one attack prevents subsequent attacks. With children scarlet fever is one of the most infectious of diseases, although at

times it behaves capriciously. Sometimes children who have never had it escape, although freely exposed to its contagion. Again, the slightest momentary exposure may be sufficient to give the disease.

The poison of scarlet fever is very readily conveyed in clothing or other things even long distances. Such cases as this are so common that almost everybody knows of them: A person calls to enquire about his neighbor's child who has this disease, opens the door for just a moment, perhaps does not go in, walks a long way home, and then gives the disease to his own children.

The contagion may be preserved for many months in clothing or in rooms. An article, for instance, a handkerchief or a doll, may be used by a scarlet-fever child and then laid away, perhaps a year, and when unpacked give the disease to other children. A letter or a paper sent by mail may bear the disease, the hair of the head or the beard may carry it, when the clothing has been changed and disinfected and this part of the body neglected.

After recovery, for several weeks at least, the scarlet fever patient continues to be a source of danger to others, as long at least as the skin continues to be rough and to give off its branny scales of desquamation, or peeling.

## PREVENTION.

In spite of the subtle infectiousness of scarlet fever, preventive measures will be rewarded with marked results. Carefulness can keep the infection from being scattered abroad, and disinfection can utterly destroy its power to do harm.

Keep your children away from the disease and away from persons and things that have been where it is. Keep, also, all who have recently been sick of the disease and all who have been where it is away from your children. Scarlet fever is always a dangerous and often a deadly disease; therefore, it may sometimes be your duty in protecting your children to treat the grossly careless as malefactors. This duty of protecting your family from the danger of scarlet fever is as clear and imperative as would be your obligation to stay the hand that would carry a deadly draught to the lips of your child. One great reason for warding off scarlet fever is that after childhood this disease is not so fatal, and also after childhood the liability to take the disease is very much lessened. It therefore happens that many escaping the disease in childhood never have it, although many times exposed to it later in life.

## RESTRICTION.

The scarlet fever patient should be put into a room by himself. It is better to have the room in the upper story and at a distance from rooms inhabited by children. Before the patient is put into the room, remove everything possible which can catch and retain the poison of the disease, viz, carpets, useless curtains, unused clothing.

Notify the secretary of the local board of health at once.

Have some person specially employed as a nurse, who is not to visit other parts of the house. No other person not needed should be allowed to visit the sick room, especially those who have children of their own or who must go where children are. The nurse while attending the patient should wear only such clothing as can be disinfected by boiling, before she goes to other places.

The room should be ventilated as thoroughly and constantly as possible without incurring the danger of draughts. Especially during convalescence a chill is to be avoided. Ventilation is desirable, both on account of the patient and on account of diluting and letting out the poison of the disease, so that its concentration may not be a danger to others in the house.

Receive the discharges from the throat and nose upon pieces of linen or cotton cloth, which are to be burned immediately.

The discharges from the bowels and kidneys should be disinfected with Solution A\*, Solution B or Solution C in large quantity, and buried at some distance from the dwelling.

The utmost care should be taken with the clothing of the patient. Do not carry it from the sick room dry. When removed, it should be dipped into a tub of Solution C (1 : 2000) or Solution E, and afterwards boiled.

No person from a house where scarlet fever is should go into public assemblies, such as schools, churches or concerts, or anywhere into the presence of children who have not had the disease. Much of the contagion of scarlet fever is in the scales which are thrown off from the skin during desquamation; it is well to use frequently, during this period, inunction of some oil or other fatty matter to prevent the scattering of these infectious particles.

Persons who have had scarlet fever should never be allowed to go to school or mingle in any other way with the public for at least five weeks after the disappearance of the fever and the rash, and

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\*See "Disinfectants" on fourth page of Diphtheria Circular.

not then until the clothing is thoroughly disinfected, and the body has received a disinfecting bath, not omitting the head.

In case of death the body should be enclosed in a sheet thoroughly wet in Solution A, Solution C (eight ounces to the gallon of water), or Solution E, and put into a tight coffin, which should not afterward be opened. The funeral should be strictly private, and in no case should children be permitted to be present.

After recovery or death vacate the room; burn all things which are of but little value; disinfect everything else, which can be so treated, with liquid disinfectants (Solution A, Solution C or Solution E), and afterwards boil; disinfect the room with sulphur fumigation; wash all surfaces with Solution A, Solution C (four ounces of the solution to one gallon of water), or Solution E, and afterwards with soap and hot water; finally throw open the doors and windows, and ventilate thoroughly.

[FORM 46.]

## TYPHOID FEVER.

### ITS PREVENTION AND RESTRICTION.—(REVISED EDITION.)

ISSUED BY THE STATE BOARD OF HEALTH OF MAINE.

There is a pretty strong conviction in the minds of sanitarians and physicians that typhoid fever is a disease which has but little right to exist in a civilized community. Such thoughts regarding things inevitable and necessary are neither reverential nor profitable, but intelligently directed efforts to diminish the prevalence of typhoid fever have been followed by so large a measure of success that we are justified in regarding it as one of the *unnecessary* diseases.

The prevention of typhoid fever must rest very intimately on a knowledge of its cause, or, at least, on an acquaintance with the known laws in accordance with which that cause operates. The essential cause of the disease is generally believed to be a minute organic germ, which is given off by the sick, and may be transmitted to the well in several ways.

The poisonous germ is not thrown off through the breath, or in the exhalations from the skin, as is the case in some other infectious diseases; but in this disease it is contained in the discharges from the bowels, and possibly also in that from the kidneys. Hence the proper disposal of the excreta is a matter of the first and highest importance.

Another conclusion which is generally accepted is that the disease germ, as it leaves the body, is not yet in a condition to be dangerous, but that in a short time, through a fermentative process, it acquires a dangerous character ; **therefore, the need of the disposal of all discharges from the patient without delay.**

Still another thing which experience seems to teach, and which the public should bear in mind, is that this fever-germ may be not only developed but multiplied outside the human body. That the fever patient is in some way a factory for the time being, engaged in producing and throwing off a poison dangerous to other persons, is a matter of common belief ; but, of late years, there has come a settled conviction that this poison, or disease germ, as we now call it, may be, and very often is, developed and multiplied to a dangerous extent outside of the human body, when it is once introduced into places which present the favoring conditions of moisture, warmth and filth. **Hence the vital necessity of care not to plant the dangerous seed in soil congenial to it.** Such dangerous localities about our homes are ill-kept water-closets, privies, cess-pools, drains, and earth which is saturated with uncleanness.

The poison of typhoid fever may sometimes be received into the system by breathing it in ; but, in undoubtedly the great majority of cases, the disease germ finds its way into the intestinal canal by means of the food and drink. Reflection will show, and experience teaches, that there are many ways in which our food and drink may become contaminated with the germs. Some of the more frequent ways are these : The discharges are thrown into the privy or upon the ground, whence they soak, sometimes long distances, through the soil into the family well. The soiled clothes of the patient are washed, and the water carried by a loose and leaky drain which runs too near the well. Some kinds of food and drink are very absorptive of disease germs, and being kept too near the patient, become contaminated through the air. Many cases are known where milkmen, with fever at their own homes, have caused serious out-breaks of the disease among their customers, by keeping the milk, before it was distributed, too near the sick, by diluting it with contaminated water, or even rinsing the cans with the impure water.

### PREVENTION.

What has already been said about the development of the typhoid fever germ and the ways it is taken into the system pretty plainly indicates the line of our endeavor in preventing it.



It is to be borne in mind ;

*1st.* That filth, if it is not the direct cause, is at least the *nidus* (nest) in which the cause, or germ, may be developed.

*2d.* That the poison is principally given off from the bowels.

*3d.* That it is usually received into the system in the food and drink.

1. At all times, as well in the absence as during the presence of typhoid fever, let us try to keep our premises and their surroundings as pure and clean as possible. Of all forms of filth none others are so dangerous to our homes as that of the "hole-in-the-ground" privy, and that in and about our sink drains. The former should never be tolerated, nor the latter, either, in its usual forms.

Filth, in its sanitary signification, includes not only the grosser forms but also the less tangible and more *respectable* kinds which are too often ignored. The impalpable but not inodorous kind in the air of unventilated bedrooms is disgusting and dangerous ; the sewer-air which leaks from faulty water-closets or defective drain pipes in the homes of the wealthy consigns many to the tomb ; the emanations from rotting chips or sawdust, the exhalations from decaying vegetables in the cellar,—all these may dangerously pollute the air, and should be avoided.

2. All discharges from the fever patient should be received in a vessel containing a pint or more of Solution A,\* Solution B, or Solution C (1 : 500) and kept covered by the disinfectant three or four hours, and then buried in the earth where they cannot by any possibility find their way into wells, springs or brooks. **They should never be allowed to mingle with any kind of filth, in a privy or elsewhere.**

The clothing, both of bed and patient, should be disinfected by dropping it into a tub containing several gallons of Solution C, (1 : 2000) or Solution E, and should be kept therein until it can be boiled. After death or recovery disinfect the room with sulphur fumigation, followed with washing the floors and other wood-work with Solution A, Solution C, or Solution E.

3. As far as concerns the personal hygiene of nurses and attendants, it may be said that, if the foregoing preventive measures are carefully carried out, there is hardly a possibility of their taking the disease ; in fact, under such conditions, cases in which the attendants have taken the disease from the patient are almost if not quite

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\*See "Disinfectants" on last page of Diphtheria circular.

unknown. Typhoid fever goes through families because all have been exposed to the disease-producing cause; or the first cases contaminate the water supply, or "seed down" the privy-vault and the house-surroundings with the disease germs.

Nurses and others in the family should eat nothing in the room where the patient is, nor anything which has been there. The food for the attendants and family should be prepared and kept as far from the sick as possible. Thorough boiling will kill all disease germs; so, while the fever is in the house, it is safer to boil all water and milk just before it is used.

[FORM 47.]

### IS DIPHTHERIA CONTAGIOUS?

[ISSUED BY THE STATE BOARD OF HEALTH OF MAINE.]

This circular is published for the purpose of correcting a misapprehension which, to some extent, exists in the public mind regarding the question of the contagiousness of diphtheria. Unfortunately every year there are found persons or communities which are not yet quite sure that diphtheria is infectious, and, like the person who proves whether the pistol is loaded or not by aiming it at his own or somebody's else head and pulling the trigger, these doubting persons often infect themselves, their families, or their neighbors and keep up and provide sources of infection, which insure the non-extinction of the disease.

The direct communication of the disease is shown in the following instances:

A young lady came home sick with diphtheria in a mild form, and on her arrival, her brothers and sisters embraced her. They were all attacked with a malignant type of diphtheria, and one died. The young lady visited her aunt in another family where there were four children, who took the disease and one died. No other cases in the vicinity. (I, 256.)

At the death of a child from diphtheria, two women helped in laying it out. One of them, who was fifty-three years of age, was attacked in a few days and died in three more. The other took the disease in a light form and recovered. (II, 17.)

A boy who had had diphtheria in Boston, came to this State to visit some relatives. In a few days after his arrival his aunt washed some

of his clothing and was taken with diphtheria the next week, and it went through the family, four cases. Before the aunt was taken sick the boy went to another place and played with another boy, who took the diphtheria and gave it to two other persons in that family. (1, 189.)

An only child was taken sick with diphtheria and died on the fourth day. The young mother in her grief kissed the child and took the disease. Within a week she was buried beside the child. (1, 261.)

In 1881 there had been no diphtheria in my neighborhood for nearly four years. The school teacher, during the summer vacation, went to the city, a notorious hot-bed of diphtheria. While there he contracted what he called a slight sore throat. He returned with this still upon him and opened school. In less than a week there were six lying sick with diphtheria and the school was closed. As the children spread the disease in their several families, it resulted in five deaths, three of which were adults. (1, 78.)

In the following cases the infection was communicated indirectly through the medium of clothing or otherwise:

Three children in one family died of diphtheria in the croupous form. The nurse believed it was not possible to carry the disease in clothing and said she would not change her dress upon leaving the house, and she was not afraid to take her children in her lap upon going home. She was admonished against such a foolhardy course. She told the neighbors a week after returning home that she did not change her clothing after coming from the infected house, "And," said she, "my children have not got the disease." Ten days after she left the infected house the physician was called and found her family with diphtheria of the most fatal form. One child died in thirty-six hours after it was attacked. These were the only cases that occurred anywhere in the neighborhood of the nurse's home. "It is needless to remark, that nurse now believes it is very contagious." (I, 109.)

A lady went from Maine to help to care for a family sick with diphtheria. Two of the patients died and one recovered. Three weeks after the recovery of the last patient, and after disinfection of the house and the surviving persons, the lady returned to her home in a section of this State where diphtheria had not been known for a long time. Five days after her return her only daughter, a girl of thirteen, took the disease and died. (I, 162.)

A woman died of diphtheria in Lynn, Mass. Her son brought her clothes and bedding home, his wife washed them, took the disease, and died in less than a week. (I, 169.)

The cases like these, which unmistakably show the contagious nature of diphtheria, are innumerable, and at the same time there are innumerable instances in which diphtheria has not been communicated to others, though others have been exposed to it. What does this prove? Not by any means that the disease is not contagious, but, as in scarlet fever, small-pox, cholera and the plague, that all persons are not at all times susceptible to the infection. Another thing which makes the infection of diphtheria doubly dangerous is its persistent vitality. Many cases like the following show that unless care in disinfecting and otherwise be taken, the infection will survive to start mysteriously another epidemic at some future time—months or perhaps years afterwards.

A boy whose home was in Perry visited a family in Eastport, where there were cases of diphtheria. He took the disease in a light form and recovered. Upon his return his sister, aged sixteen, took the disease and died in three days. Six months afterwards another sister came from Massachusetts and occupied the room which had been the sick-room. She took the diphtheria and died after five weeks' sickness. (II, 111.)

A little girl nine years of age was found by the physician to have diphtheria in a malignant form and she died two days afterwards. The sanitary condition of the place seemed very good, and no other cases of diphtheria were in the neighborhood. It was ascertained that the grandfather, of whom the child was very fond and in whose lap she would sit much of the time, had come from a neighboring town to spend a few weeks with them—that in his family eight months previously there had been several cases of diphtheria, one fatal. The children had been sick in a room adjacent to which was a clothes-press where the old gentleman's clothes had hung. He had had no occasion to use them until the present visit to his daughter's. That clothes-press had not been disinfected. (II, 82.)

These cases, with many more which unmistakably show the dangerously infectious character of diphtheria, were reported in the first two volumes of the Report of the State Board of Health, and the citation after each refers to the volume and page where it may be found. It is hoped that by calling attention to this subject in this special manner every person and every community may be influenced

to be careful not to spread the disease, and to demand of every other person and of every other community the same regard for the rights and the safety of others. *The assurance that a disease is contagious or infectious is an assurance that it is a preventable disease.*

## INSPECTION OF SCHOOL-HOUSES.

At such times during the winter of 1887-8 as the Secretary could leave the other work of his office, he has been employed in making sanitary inspections of some of the school-houses in the State, and the results of these examinations are here presented. The scantiness of the time which could be spared for this work has necessitated extreme haste in doing much of it, and has made it impossible to visit as many of the towns as was hoped. From the first, there was no design of making a general examination of the school buildings in the State, but only to include a considerable number of the city and village school buildings. The purpose of the inspection was a double one; to learn what are the prevailing hygienic or unhygienic characteristics of the school-houses, and to aid the public generally, and particularly the communities where the examinations are made, by suggestions, which are given in this report. It will be observed, however, in looking over this paper, that specific advice has but very rarely been given, as to how changes should be carried out to improve the healthfulness and comfort of the houses, it being deemed sufficient at this time to point out errors and faults of construction, and defer to a future report the presentation of plans and specifications, which will aid towns in building school-houses in accordance with sanitary principles. It is believed that the pointing out of the faults and the indication of right principles of construction, when they are found, will be a service of considerable value.

In this connection, prefatory to the report of the examinations, it is thought the following axiomatic presentation of a few of the more important rules for building school-houses will be a help to the general reader.

The best shape for a school-room is that of a parallelogram whose width is to its length as three to four with the teacher's desk at one end.

The ceiling should be at least twelve feet high.

Each scholar should have at least 20 square feet of floor space.

Each scholar should have at least 240 cubic feet of air space.

The combined window surface should be at least one-sixth as great as the floor surface.

The windows should be placed high, the window sills three and a half or four feet from the floor, and the tops of the windows extending to near the ceiling.

The light should come from the left and back of the scholars, or when the room is not too wide, the lighting may be from the left side only. Lighting from the right and left sides is permissible, but windows in front, never.

The blackboards should be placed opposite the windows and not between them.

The school building may be heated by indirect steam radiation, by stoves in the rooms which are arranged with a jacket and fresh-air inlet, or by means of a furnace if one can be found which will admit air in sufficient quantity.

For the proper ventilation of the school-room it is desirable to supply from thirty to thirty-five cubic feet of fresh air per minute for each scholar, or as near to this amount as may be practicable.

#### AUBURN.

##### *Grammar School.*

This is a three-story, brick building having four rooms each on the first and the second floors, and two on the third. The plan and size of the rooms is exactly the same on the first two floors, and differs on the third only in having but two rooms fitted up. A central hall on each floor runs through the building from east to west, and the two rooms on each side of it are separated by the hat and cloak-rooms and a small room for the use of the teachers. The size of all the rooms is 28x27 feet, and, as the teachers' desks are all located in the end of the room towards the cloak rooms, the lateral light from half of the windows comes from the scholars' right, and in the other half from their left-hand side. Each room has three lateral windows and the same number at the rear of the pupils. The amount of light received in the rooms is very satisfactory.

The building is heated by steam, the system of direct radiation being in use. There is no provision made for the introduction of pure air into the rooms and no way of getting it in excepting through the windows. Each room has a small foul-air register near the floor, opening into flues which are not heated. The following record of the testing of the rate of movement of air through these different

registers shows that there is a great difference in the rapidity, and in some of them a great variability in the direction and velocity of movement.

*First Floor*—Room 1, within the minute there was an outward movement of air of 130 feet, then a reversed inward movement of 45 feet, then again an outward movement of 40.

Room 2, 170 feet. Room 3, 290 feet. Room 4, no movement whatever.

*Second Floor*—Room 5, the direction and rapidity of movement of air through this register was found to be very uncertain; generally with the windows closed there was no movement, and with them open an inward movement.

Room 6, 140 feet. Room 7, practically no movement. Room 8, 80 feet.

*Third Floor*—Room 9, 165 feet. Room 10, a downward, or inward, movement of 380 feet.

Although this building has no fresh air supply excepting what can be obtained through the windows, and has no foul air ventilation which is at all trustworthy, we take pleasure in referring to it as an example of what may be accomplished by the best use of the means which are at the disposal of the teacher. All the rooms have double windows, and, by a constant and skilful use of these, it seemed that the air of the room was kept in a tolerably good condition. The air was tested in only one of the rooms, and that on the first floor which was the most crowded. The test was made at 10.15 A. M., just before recess, and there was found to be twelve parts of carbonic acid in the ten thousand of air. Fifty pupils were present at the time.

The building was formerly heated with a furnace, and in Room 4 a large disused register was noticed, which, when opened, delivered a volume of air into the room at the rate of 110 feet a minute. The lower end of the flue into which this register is set opens into the upper part of the basement, and when the register in the school-room is opened the objectionable cellar air is poured into the room in large quantity. When the register is closed there is undoubtedly some leakage, and the room ought to be guarded from this danger by hermetically closing up the lower opening of the old flue. The water-closets in the basement are of an exceedingly bad kind, and their setting is objectionable in that they are surrounded with crude

and bungling wood-work. Long-hopper closets, with a mere dribblet of a flush, of a kind which workmen put in now only when engaged on a job of "skin plumbing", are continually becoming clogged and endangering the school on the floors above with the bad gasses which they are constantly giving off.

One great ameliorator of the condition of the air in the basement is a large, central, brick shaft into which the smoke pipe leads, and in the base of which there is a clear opening, 19x14 inches, unobstructed by the setting of a register. Through this large opening there is a powerful draught upward, going at the rate of 1,130 feet a minute. With the miserable, old closets removed and safe ones put in, the basement could do without this ventilation, and the shaft could then be made a valuable means of ventilation for some of the rooms above.

#### *High School.*

This school building was inspected during the noon intermission, but, as the notes which were made at the time have by some means become lost, a few particulars only will be given from memory. The main school-room on the first floor is a large room, lighted only from its two sides, and, on account of its great width, evidently insufficiently lighted in its middle portion. The building is heated by direct steam radiation. There are no arrangements in the building for ventilation, either for the admission of fresh air or the removal of foul air. A careful supervision of window ventilation by means of window boards might accomplish much, but is not used either in the principal school-room or the recitation rooms on the second floor.

About half an hour after the close of the forenoon session, the air was tested in the principal school-room and was found not to be in nearly so good a condition as that of the most crowded room of the grammar school which had just been visited.

#### AUGUSTA.

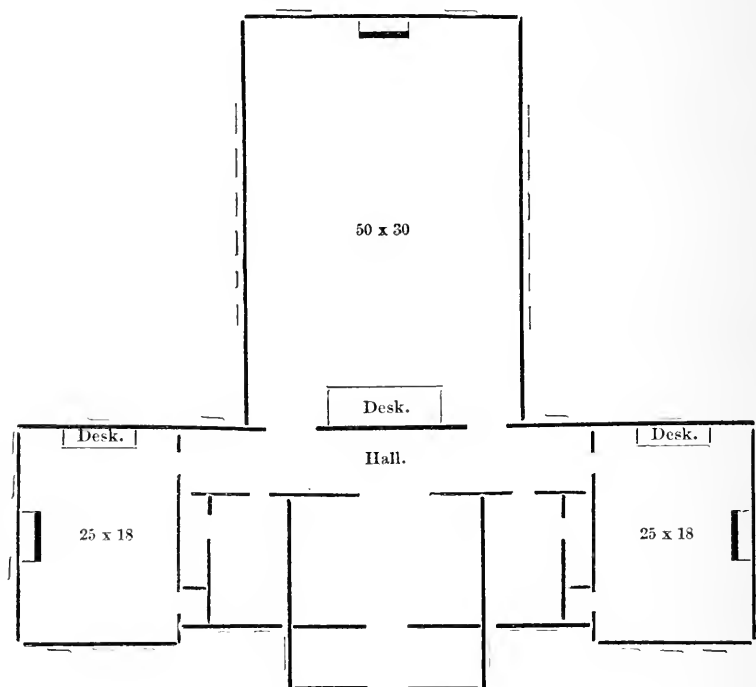
##### *Cony High School.*

This building was erected in 1880. Externally the style of its architecture is pleasing, and the interior plan and finish are generally very commendable. The first floor contains the hall, staircase, two recitation rooms and the principal school-room. On the second floor



are the assembly room, hall, chemical room, and one recitation room. The school-room is 50x30x14 feet in size, and is lighted by six windows on each side and two at the rear of the room. The glass is 24x15 inches; there are eight panes in each window, and the window sills are placed at the good height of three and a half feet from the floor; consequently an abundance of light enters the room. The windows on the two sides look to the north and the south, and when the sun is shining, the inside shutters on the south (the scholars' left) are kept closed, thus the principal light for all the school then comes from the right hand side, and the light for those near the south side straggles through the chinks of the blinds, or comes in too feeble intensity from the distant north windows. This method of taking the light from the north and south sides has its advocates, but when the room is more than 24 or 25 feet in width, the lighting cannot be expected to be entirely satisfactory, when the shutters on one side are closed. Where it is possible, the scholars' desks should be so arranged when this north and south lighting is used, that the light from the north windows shall come from the scholars' left. The heating is by indirect radiation, steam coils in the basement being enclosed in boxes into which fresh air is taken and warmed, and then passed into the school-room through four registers, one in each corner. Each of these registers is 20x15 inches in size, and the following shows the rate of movement per minute of the warmed air through them, a moderate wind from the north-west prevailing at the time; north-west corner, 170 feet; south-west corner, 250 feet, north-east corner, 270 feet; south-east corner, 330 feet. The removal of foul air is accomplished by means of an open fire-place, in which a mild fire is kept burning for ventilating purposes. The opening in the throat of the chimney is 30x8 inches, and the air was passing upwards through it at the rate of 270 feet per minute. Additional means for the removal of the foul air are a register, 17x12 inches in size, which enters a separate flue over the fire place near the ceiling, and through which the air movement was 405 feet per minute, and another register in the wall near the floor at one side of the fire-place, and this also communicates with a separate flue. The size of this register is 21x13 inches, and the velocity of air through it was 220 feet per minute. The air of the room with Wolpert's tester showed only 8.3 parts of carbonic acid, a result better than has been found with the air of any other school-room examined.

There are three recitation rooms in the building, all of about the same size, namely, 25x18 feet. Two of these are situated on the first floor in the north-west and south-west wings, and one on the second floor over the lower south-west recitation room.



CONY HIGH SCHOOL, AUGUSTA.

*Recitation Room in South-West Wing*—This is lighted from the right and the rear, is warmed by indirect radiation and is ventilated by means of an open fire-place and a register which enters a separate flue at the left of the fire-place. The opening in the fire-place is 18x6 inches, and, with a few brands burning on the hearth, the air moved through it at the rate of 430 feet a minute. The air movement in the 6x11 inch register at the left of the fire-place was 250 feet a minute.

*Recitation Room in North-West Wing*—This was originally planned to be a counterpart of the south-west room, excepting that the light comes from the left and the rear, but the arrangements for heating and ventilating worked very unsatisfactorily on account of the down

drafts in the flues. This trouble was caused by the proximity of the tall tower which is a characteristic of the exterior plan. This led to the closing up of the open fire-place and of the foul air register, and, upon the recommendation of Dr. J. O. Webster, ventilation was provided for by running a tin pipe from the ceiling of an adjoining closet up through the tower. This pipe 12 inches in diameter is heated by seventy-two feet of steam pipe arranged as a coil within it. To have the foul air taken from near the floor instead of from near the ceiling, the closet door is kept closed, and a horizontal panel from the lower part of the door has been removed.

The movement of air through the lower opening of this pipe near the ceiling was 630 feet per minute, and through the opening in the lower part of the door, 150 feet, the temperature of the room being 66°. To supplement the warming of this room a steam radiator has been placed within the room itself.

*Recitation Room on Second Floor*—This was originally designed for the laboratory and consequently is not well lighted for a recitation room. As it is now, it is lighted by two rather small and high windows at the rear, and two in front of the scholars. The velocity of movement of the air through both the warm air and the foul air register was found to be exactly the same, namely, 280 feet per minute. We notice with satisfaction that short hopper closets of a suitable kind are in use in the basement, but, on account of the insufficient size of the supply pipe for each, the flush is not so thorough as it should be.

#### *Grammar School.*

This building has four rooms on the first and the same number on the second floor, besides one school-room and a hall for general exercises on the third floor. On the first and second floors, a space, occupied by hall ways and clothes-rooms, separates the front, or eastern, from the western part of the building. The four rooms east of the clothes-rooms are each 45x25 feet in size, while those west of the clothes-rooms are 42x20 feet. The height of ceiling in these eight rooms is fifteen feet. The teachers' desks in all the rooms are placed towards the central part of the building, consequently the light in one-half the rooms comes from the right side and the rear, and in the other half from the left side and the rear. The windows are placed at a good height and furnish an amount of light which would generally be regarded as sufficient. The windows are supplied with

inside shutters. The building is heated by steam, the so-called direct-indirect method being used, that is, the radiators are placed within the rooms against the outer wall, where a series of openings about two inches square, of the thickness of a brick have been left in the wall for the entrance of fresh air. This series of small openings arranged checker-board fashion in the wall behind each radiator occupy a space of about sixteen square inches, and as the registers are not encased or jacketed, their action as fresh air inlets cannot be otherwise than very variable depending very much upon the direction and force of the wind. For the foul air removal each of the four rooms in the front part of the building has four registers, two near the floor, and two near the ceiling, while the four rooms in the back part have two similarly placed. These registers are all about 18x12 inches in size, and the understanding is that in cold weather the upper ones are to be kept closed while the lower ones remain open.

The following shows for each room on the first and the second floor, the temperature within the room, the number of pupils present, the velocity of movement through the foul air registers, and the amount of carbonic acid as determined with Wolpert's air tester. The observations were made in the latter part of the afternoon session, and the temperature of the external air at the time was about 15° F., while the wind was west and light.

*First Floor*—Room 1. Temperature, 76°; scholars, 35; east register, 215 feet per minute; west register, 260 feet; carbonic acid, 10 parts.

Room 2. Temperature, 76°; scholars, 47; east register, 270 feet; west register, no movement; carbonic acid, 10 parts.

Room 3. Temperature, 72°; scholars, 38; register, no movement; carbonic acid, 9.5 parts.

Room 4. Temperature, 80°; scholars, 19; register, no movement; carbonic acid, 9.1 parts. In this room one-half the scholars had been dismissed a quarter of an hour before the air was tested. The lower registers in rooms three and four were found partly closed and immovable by a mass of mortar which had fallen down inside the flue when it was constructed or repaired.

*Second Floor*—Room 1. Temperature, 70°; scholars, 40; east register, 175 feet; west register, 190 feet; carbonic acid, 10.5 parts.

Room 2. Temperature, 68°; scholars, 42; east register, 110 feet, and variable; west register, 250 feet; carbonic acid, 14 parts.

Room 3. Temperature, 72°; scholars, 21; register, 190 feet; carbonic acid, 13 parts.

Room 4. Temperature, 75°; scholars, 32; register, 185 feet; carbonic acid, 11 parts.

The results that were obtained with the tests for the carbonic acid in the air are not so good as should be aimed for in a school-room atmosphere, but are better in some of the rooms than have been found in houses that have more modern, and what are supposed to be better arrangements for ventilation; and so favorable a showing could not be obtained excepting by the use of the windows as auxiliaries. The windows are opened at the various intermissions of school, and each window is supplied with a window board which is kept under the sash most of the time. The foregoing observations were taken with doors and windows closed.

*Room on Third Floor*—Temperature, 70°; scholars, 55; south register, 98 feet; north register, 110 feet; carbonic acid, 10.5 parts. This room is 40x20 feet in size. It is lighted from the left, and the rear. There are also two windows in front of the scholars but the shutters are kept closed.

Provision is made for the removal of foul air by means of two large registers, 23x20 inches, which communicate with a flue heated with steam coils.

The high temperature in some of these rooms was caused by the closure of the windows while the observations were made.

Water-closets of the short-hopper variety are set in the basement, but the wooden platform upon which they and the urinals are placed is objectionable. It would be much better if the floor in these places were of a kind which would not absorb moisture and which would admit of thorough cleansing by flushing with water if need be. The urinals are not supplied with a constant water service, and have no flushing excepting what is occasionally received through a small hose in the hands of the janitor. The smell which comes from them is unpleasant, and they must be considered unsafe beneath a school containing so many pupils.

#### *Grove Street Primary.*

This is a brick building, with a room on each of the two floors, about 25x29 feet in size. These rooms are fairly well lighted with windows on the sides and at the rear, and placed three feet above the floor. The rooms are heated by means of a coal stove in each room, and,

by means of a Russia iron jacket and the fresh air duct which brings in the air and discharges it beneath the stove to be warmed, it is converted into a ventilating stove, but the capacity of the arrangement for admitting fresh air is apparently inadequate. For the removal of foul air a register 18x10 inches is set in the wall on each side communicating with flues which are not heated. The stoves are in the south-west corners of the rooms. It would have been better, if they, with their fresh air inlets, had been placed in the north-west corner. As they are now situated there is some difficulty in warming the north side of the room during the coldest weather when the wind is in the north or north-west.

#### *French School.*

This is a two story wooden building with two school-rooms. The lower room was finished in the summer of 1886 and the one on the second floor this past season. The plan of the building, in some respects, is a very good one indeed. The porch containing the entrances, stairway, and fuel room is on the south side of the building and the lighting in both rooms is by means of five windows on the left and three at the rear of the scholars. The windows run to near the ceiling and the light of the room, coming from the north and west, is very mild and pleasant for school work.

The lower room is heated with a large furnace set in the north-east corner of the room which receives its fresh air through an inlet of ample size and which discharges the warm air into the room. The upper room is heated in the same way with a Western Champion Heater.

The arrangements for removing the foul air from the lower room are three registers of ample size, one on either side of the school-room and one at the rear. These open into wooden foul-air ducts beneath the floor which converge to the chimney flue in the north-east corner of the room. As these foul air ducts beneath the floor pass through a basement which is not warmed, and is protected on the cold north side only by the boarded and clapboarded wall, the cooling of the air in the ducts which thus results apparently destroys the efficiency of the ventilation. The unsuccessful results may be due in part also to the want of complete imperviousness of the wooden ducts.

In the room on the second floor, the air is discharged under the teacher's platform, thence into the foul air flue. In the lower room

the air meter showed that there was a good movement of fresh air into the room, but that there was no movement whatever at the foul air registers. There were found in the air of this room 22 parts of carbonic acid in the ten thousand.

In the room on the second floor a rapid movement of air was found through the fresh air inlet, but the velocity of the movement through the foul air register was not satisfactory. In this room there were 14 parts of carbonic acid. The lower room contains on an average sixty scholars and the upper room fifty-six. The observations were taken near the close of the afternoon session. The external temperature was nearly zero.

#### BANGOR.

The school buildings generally, as far as examined, show a very careful supervision; and, though some of the houses are very old, and should be superseded by more suitable buildings, the judicious work of the present school agent has converted some of the older buildings, which formerly, on account of their unsanitary conditions, must have been almost intolerable nuisances, into quite respectable school-houses. I was particularly interested in what Mr. Bradbury, the school agent, told me of his improvements upon the old and dangerous systems of disposing of excreta by means of privy vaults or leaky water-closets and drains. A few years ago he conceived the idea, which he thought at the time was original, of putting in for the use of schools a trough closet, about the shape of the cast-iron privy sinks, which are in use in many schools outside of this State. He went to work by getting the Hinckley and Egery Iron Company to cast a "gate," as he calls it, to be used in connection with the proposed trough closet. The trough is about three feet wide, nearly the same in depth, and of the required length, built of brick, and lined with cement, so that its inner surface is glazed and quite smooth. The bottom is laid with a considerable grade to the lower end, where the gate is placed. The seats are placed over the front of the trough and the janitor alone has access to the back and to the gate for flushing. The closets stand nearly full of water during the day, and are flushed daily in the evening, and, at the same time, when the outlet is opened, the water is let on at the upper end, and the inside of the receptacle is scrubbed clean by the janitor. I was also interested in the account which was given of the good effects on the moral character and the practice of cleanliness, which have been

observed to follow, particularly in some of the schools where many children of foreign parentage attend, after certain improvements had been made and certain conveniences had been supplied.

### *The High School.*

The building was erected in 1882, is of wood, two stories in height, and has five school-rooms on each floor. With the exception of two rooms on the second floor, one of which is 40x48 and the other 30x25, all the rooms are 30 feet square. The lighting is from the scholars' left and back, excepting in the middle room on each floor, in which the lighting is from the left side alone. The room on the first floor which has the unilateral lighting, is too wide to be satisfactorily lighted from one side; in the one on the second floor, where the width is only 25 feet, the lighting a part of the time is very good indeed. A year ago a visit was made to this house on a very dark and stormy day, and, in this narrower room with the one-sided lighting, I was very much pleased with the light; at the time of the visit which was made this year on a bright winter forenoon the light was too dazzling. Upon the whole the lighting in this building appears to be uncommonly good, and the arrangement of windows and seating shows that a comprehension of the requirements of good lighting in a school-room guided the architect. All the windows are double and have inside shutters.

Each of the rooms, except one, has a wardrobe, and the entrance to the school-room is either directly from the hall or through the wardrobe. The manner of finishing off the wardrobes merits the attention of those who are planning similar buildings. Instead of having the wall carried up in the usual way to the ceiling, the wardrobes are taken out of the hall, and are divided off with a neatly matched board partition, extending only a little more than half-way to the ceiling. There are some advantages from this arrangement, first, in point of economy, and second, when the general hall is properly warmed and ventilated, in point of comfort and healthfulness.

The heating throughout is by direct radiation from steam pipes. There is no ventilation except through the windows; and, though this means of admitting pure air and getting out the foul appears to be regulated with intelligent care, the air in Room A showed sixteen parts, Room B, twenty, Room C, eighteen, and Room D, eighteen parts of carbonic acid gas in ten thousand of air. It is very desir-



able that a school-room atmosphere should not contain more than six parts of carbonic acid in ten thousand.

The basement was found in good condition, except a slight smell from the urinals. The closets are not of the most approved kind.

*Grammar School.*

This is not so satisfactory a building as that of the High School. It is of brick, three stories high, and has four rooms on each floor—twelve in all—which usually contain about five hundred pupils. The rooms are all of the same size, 27 by 27 feet, with a height of wall of 14 feet. The heating was formerly by indirect steam radiation, but apparently on account of faulty arrangement, it cast undeserved discredit upon this system, and the apparatus was removed. The present system of heating is by direct radiation, the steam pipes being in the room. One room in the third story is heated with a hot air furnace in the cellar.

Ventilation was sought by means of an ill planned brick shaft at each end of the building. The movement of air through these shafts and the foul air registers is probably not what it ought to be. The foul air flue on the east side is heated with steam coils, that on the west with the warm air pipe and smoke pipe from the furnace. Wolpert's air-tester showed, in a few of the rooms which were tried, about twenty parts of carbonic acid in the ten thousand of air.

Each room has two windows at the back and left of the scholars, and all are provided with inside shutters. The rooms on the third floor are decidedly deficient in light, on account of the setting out of the windows on the mansard roof. The basement is provided with the trough closets before mentioned, and were found in excellent condition.

*Salem Court Intermediate and Primary.*—This is one of the old houses, a wooden building two stories high, with a school-room on each floor. 30x36 feet, and after the old style, with ceilings only ten and a half feet high. The style of the windows is also in keeping with the antique in school house building, six in each room with twenty-four lights, each 8 x 10 inches. The window sill is low. It follows, of course, that the rooms are poorly lighted. The heating is ample, but it is done with wood stoves which are not jacketed. The trough water-closet in the basement was in good condition, except a slight odor from urinals, on account of a temporary freezing of the supply water pipe.

*State Street Primary.*

This is another of the old school houses. The rooms, one on each of the two floors, are about the size of those in the Salem Court building, but the lighting is better, partly on account of more glass surface, and partly on account of the higher position of the windows. The heating is by means of wood stoves. In the basement long hopper closets with a continuous trickle, but no sufficient flush, are in use. For an old building this is a fairly good one, and it is said that this school is generally liked.

*Division Street Intermediate and Primary Schools.*

This is another one of the very old buildings the retention of which is hardly a credit to the city. Here again we find in each of the two rooms the low ceiling and the traditional 8 x 10 panes; but the windows were placed high, and the rooms appeared to be fairly well lighted. The heating again is by direct radiation from the side of wood-burning stoves. Privies are used, with an incomplete separation for the sexes.

## BATH.

*High School Building.*

This is a two story brick building, having a room on the second floor 48x45 feet, and two rooms on the first floor, each about 48x22 feet. In the room on the second floor the heating is by means of three large wood-burning stoves, two in front and on either side of the scholars, and one at the rear and left corner. There are four flues running up through both floors, and in connection with these a system of ventilation was planned, as far as foul air is concerned, by putting in registers 15x9½ inches, one in each flue near the floor and one near the ceiling. As the outer row of desks is placed against the wall, the lower registers are made unavailable for ventilating purposes and were found filled with bits of paper. All of these four flues are heated by the smoke pipes of the stoves either on the first or the second floor, and the rate of movement of the air through the upper registers was found to be uniformly good, being respectively, 330, 350, 330 and 350 feet per minute. The air was tested for carbonic acid just before the forenoon recess, and showed 13 parts per 10,000.

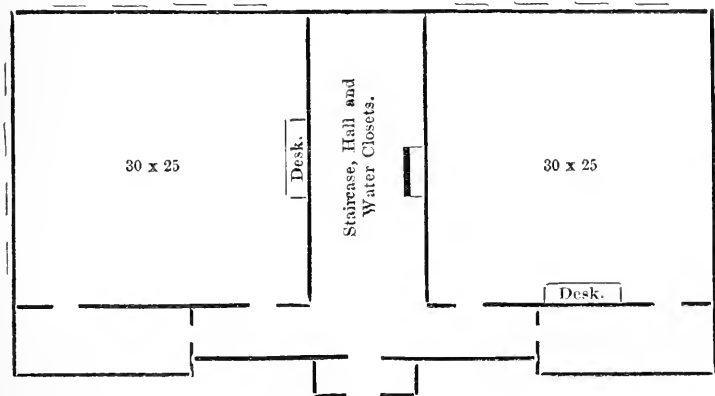
The lighting is by three mullion windows on each side, and two in front of the pupils. The amount of glass, if it were all placed

upon the sides of the room, would give very satisfactory lighting ; but the windows in front of the scholars are a nuisance.

On the second floor the desks are so arranged in one of the rooms, that the light comes from the left and the rear ; in the other, it comes from the left and one window in front. The last mentioned window should be kept constantly closed with shutters. The privies for the building are outside.

### *North Grammar School.*

This is a new building of brick, very pleasing in its external appearance and general internal arrangements, and intended to be a model school building. But for a few faults, which unfortunately are quite serious, it would be one of the best buildings to be found in the State. It contains four school-rooms, two on each of the two floors, and on each floor between the two rooms are found a stairway and the water-closets. The common hall and clothes-rooms are on the south side and in front of the school-rooms. The rooms are all 30x25 feet, and the desks are so placed that the lighting is from the left and rear ; but to have this arrangement the desks in the rooms on the west side are placed on one of the longer sides of the room. The lighting in the rooms is very satisfactory indeed. The windows are placed quite high, the window sill being  $3\frac{1}{2}$  feet from the floor, and the ratio of glass to floor surface being higher than is often found,—about 1 to 5.



NORTH GRAMMAR SCHOOL, BATH.

The heating is by the so called direct-indirect radiation, by means of steam radiators. In each room there are two radiators set in slightly

depressed niches in the outer walls, and the air from the outside is admitted upon the radiators by means of openings in the walls, but the registers are not incased as they ought to be. There are two foul air registers in each room, one in each room being behind the teacher's desk. The foul air ducts are of closely jointed, galvanized iron, and, dipping just below the lower floor, all converge to the central chimney shaft, which is heated by means of the smoke pipe from the boiler. I was informed by some of the teachers that the school board had sent word to them to keep the windows closed at all times, because the arrangements for ventilation were perfect. I arrived at the school-house just before the noon intermission, and the air was tested one hour after the scholars had left the building, the doors being closed, but the ventilating arrangements in operation meanwhile. Even then in the two west rooms there were 18 parts, and in the two east rooms 20 parts of carbonic acid in 10,000 parts of air. The wind was from the northwest. The rate of movement of the air through the foul air exits was found to be uniformly good, and was as follows at the respective registers, the steam being on at noon as during the sessions of school :

*First floor.*—East room, south side, 270 feet per minute; west side, 230.

West room, east side, 250; south side, 325.

*Second floor.*—East room, south side was found closed; after being open, 255 feet per minute; west side, 155.

West room, east side, 170; south side, 280.

The cause, or, at least, an all sufficient cause, for the failure of the ventilation of the rooms is to be found in the insufficient size of the inlets and outlets. The fresh air inlets on the outside have a metallic hood to screen them from storms. From the upper margin of the hood to the lower granite margin of the inlet the distance is only three inches and the opening is 12 inches wide. Irrespective of the hood the openings are too small. The foul air registers are  $15\frac{1}{2} \times 4\frac{3}{4}$  inches, and, as fully one-half the space is taken up by the fret-work, the opening is virtually only  $15\frac{1}{2} \times 2\frac{3}{8}$  inches. For the east room on the first floor where the average attendance is 32, the combined rates of air movement at the two registers would pass air enough out through an opening of this size to change the air sufficiently for three or four pupils, or would extract about one-eighth enough for the thirty-two pupils.

In the west room on the same floor, where the average attendance, including the teacher, is 45, the given rates of movement would remove only 189 cubic feet per scholar per hour, instead of from 1,000 to 2,000 feet per hour as it should be. The general plan for the ventilation is good, but the whole was spoiled for the want of a little reflection and careful figuring. As it is, the ventilation is very far from being perfect.

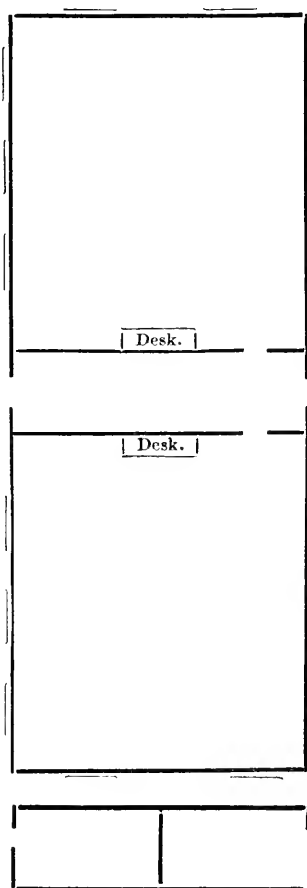
Without the best of fixtures, the water-closets would be in dangerous proximity to the school-rooms; but in this building the closets are all of a good kind—short-hoppers of the artisan pattern—and the work appears to be good. Half-way up the stairway on the first landing, there is a little room with a sink and a water tap which furnishes water from the new city supply, and this is what the little boy, who showed it to me, called the “drink-room.”

#### *The North Street Primary.*

This is a two story brick building, about sixty-four feet in length and twenty-five in width. The doors enter at the middle of each longer side, and the central hall, passing across the shorter diameter of the building, contains the long and straight stairway, and divides the building on each floor into two rooms. Each of these rooms has three windows on each side, and two at the back of the pupils. The room on the northern end of the building on the first floor is very poorly lighted, on account of the light from the rear windows being cut off by the proximity of the privy building. The rooms are heated with wood stoves. There is a foul air register in each room near the ceiling, in the same stack which receives the stove-pipe, but apparently it goes into a separate flue.

There is, however, apparently not much misplaced confidence in the arrangements for ventilation, and the teachers admit fresh air, as best they can, through the windows, which are hung with weights and pulleys to let down from the top. The feature of this school which deserves unqualified condemnation is the arrangement of the privies. They are placed in a narrow building which runs across the width of the main building, and only three and a half feet distant. They were found in the foulest condition, littered above and below. The teachers in that end of the building spoke in decided terms of the inconvenient, indecent and dangerous character of these arrangements. In the warm weather the windows on that end have to be kept closed, no matter how much they need to be kept open for purposes of cooling and ventilation; and, even when they

are closed, the smell is brought into the room through the side windows. Summer or winter, the condition of things is most dangerous.

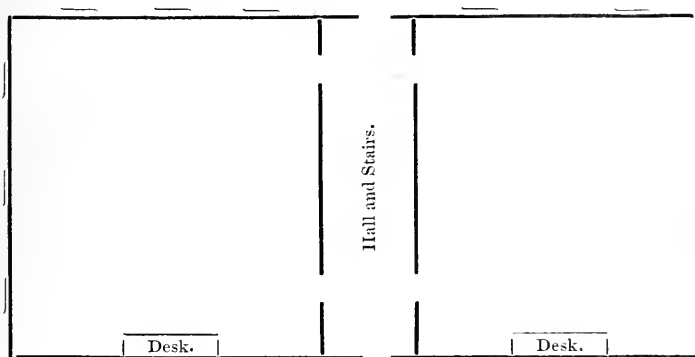


NORTH STREET PRIMARY, BATH.

*Old Academy.*

This is a very aged two-story, four-room, brick building, and it looks enough like the North Street Primary and some others in the town, both in its external appearance and interior plan, to have been the father of them all. It is undoubtedly, as has frequently been found in other towns, the ancient prototype which has shaped the

plan, whether for good or ill, in the school buildings for many succeeding years. The description of the plan of the North Street house is accurate enough for this, excepting that the scholars, instead of facing toward the hallway, face one of the sides of the room which is occupied by the windows. The authorities who permit a continuance of this arrangement of the seating as regards the light and



OLD ACADEMY, BATH.

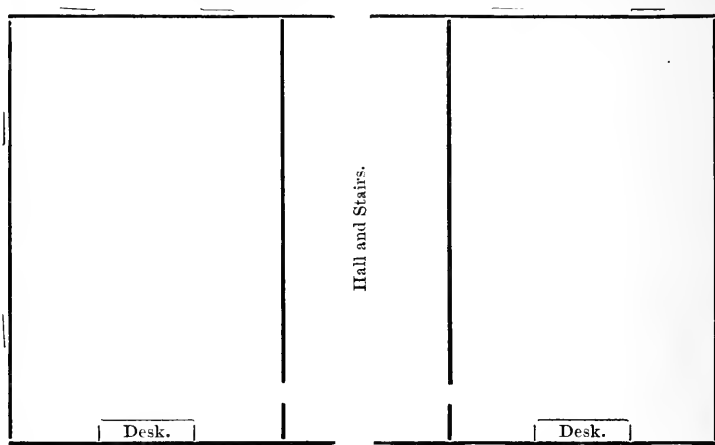
make no effort to have it remedied, ought to be compelled, these spring mornings, to sit in an immovable chair facing the southeast window, while they read their morning papers. Such an arrangement of lighting as this is believed to be a very strong factor in the causation of myopia and other derangements of the eye, which starting early in life, make themselves apparent at a later age.

The air of one room only was tested, and although there was a hot fire in the stove, which necessitated the opening quite widely of some of the windows, there were found sixteen parts of carbonic acid.

#### *South Grammar School.*

This is still another of the two-story four-room, brick school-houses built upon a plan essentially the same as that of the two foregoing buildings, and the same very faulty lighting prevails, as was found in the last. The two rooms in the South street end of the building are lighted from the front, the left and the rear; those in the opposite end from the front, the right and the rear. In these two rooms, in addition to the faulty direction from which it comes, the light is very deficient in quantity. If the two windows in front were closed,

as they should be, the collective window surface as compared with floor surface would be as one to sixteen or seventeen; and, with the two windows in front open, it is only as one to eleven. All the rooms in this building are warmed by means of wood stoves.



SOUTH STREET GRAMMAR, BATH.

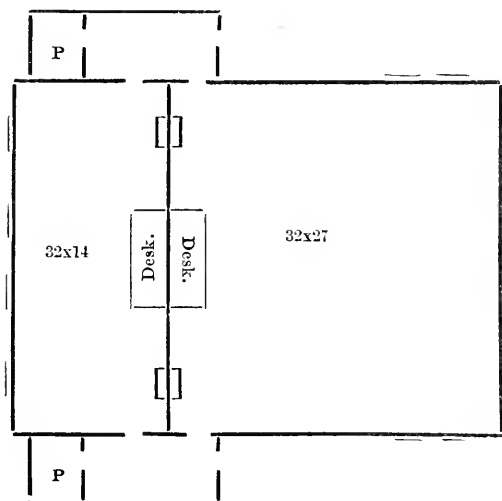
The ventilation of the building, as far as any exists, is the natural ventilation through the walls and crevices, and by means of the windows. The testing of the air for carbonic acid with Wolpert's tester in the different rooms gave from fourteen to sixteen parts of carbonic acid. The observations were made near the close of the afternoon session. The privies are built against the north-east and north-west corners of the building, and are dangerous to the school on account of their nearness.

*South Street Primary School, No. 3.*

This house contains two school-rooms, one fronting the street, a large, nearly square room, and another back of it, 14 x 32 feet in size. The larger room is heated by two wood stoves, and the smaller by one. Ventilation is attempted in an unsatisfactory manner by a foul air register in the chimney flue near the ceiling and almost directly over the stoves. Lighting in the larger room is from the rear and the sides; in the smaller room the lighting is entirely from the back. The school was not in session when the house was examined but if the forty-eight seats in the small room and the one hun-



dred and thirty-two in the larger room are all filled, it would give about nine square feet of floor space for each child in the former room, and about six and one-half feet in the latter room,—a dangerous degree of over-crowding, especially when considered in connection with the immediate surroundings.



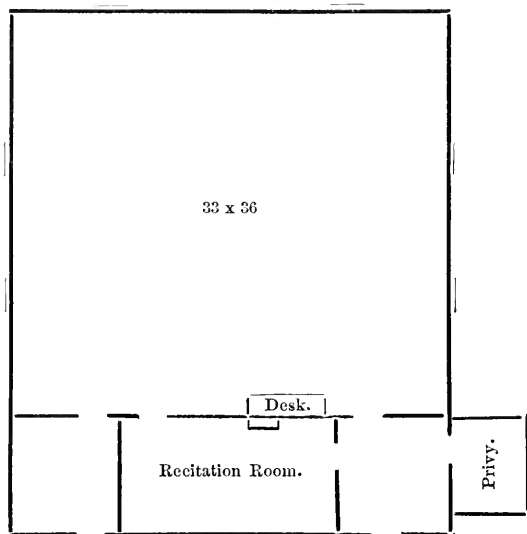
SOUTH ST. PRIMARY, NO. 3, BATH.

On each side of the building, and covering partly the larger room and partly the smaller, is a wing, the front part of which contains an entry, and the back the privies. By reference to the plan of the building, it can be easily conceived that the danger which threatens the children in these crowded rooms is a more imminent one than ought to be found in any school building. The gases from the vault which make their escape into the entry have a choice of two doors for entering the school-rooms, and of only one for making their exit to the external air. Even in the winter weather the strong odor is perceptible in these entries.

## BOWDOINHAM.

The village school building contains a high school on the second floor, and the grammar and primary schools on the first floor. It is a wooden building and it is said that it was built about fifteen years ago. The high school room is 33x36 feet, warmed by a stove in the room, and ventilated only by means of the windows.

The lighting is from the two sides and the rear, and the amount of light is rather deficient. It will be seen on the accompanying plan of the house that the quality of the light for the scholars would be considerably improved, if the windows on each side had been placed



SCHOOL BUILDING, BOWDOINHAM.

farther back, so that the light might approach more nearly from over the shoulder and from the back, instead of from the side and the front. The blackboards are of wood, and, in a room like this, there is no wall upon which they can be placed so as to receive a favorable illumination. There are curtains at the two windows nearest the teacher's desk; and, as the windows at the rear of the scholars are on the south side of the house, shutters or dark curtains there would undoubtedly call forth the gratitude of the teacher on sunshiny days.

The plan of the first floor was originally the same as the present plan of the second floor. The room is now divided, so that two rooms are obtained, each measuring 33x18 feet, with the ceiling 11½ feet high. As about forty-five pupils attend in each of these lower rooms, each pupil has about 13 feet of floor space, instead of the required 20 feet, and less than 150 cubic feet of air space, instead of 200 to 240 as he ought to have.

By referring to the plan of the house, it will be seen that the arrangement of the privy is an outrageous piece of ingenuity to make the children sick. It is two stories high, is built directly against the side of the house, and, still worse, against the north-west corner, whence the prevailing westerly and northwesterly breeze may waft the exhalations into the windows, which need to be kept open for ventilation in warm weather on account of the crowding which prevails, especially in the lower rooms. Even if the school on this unfortunate side of the house should seek to protect itself by closure of the windows, a dangerous quantity of the gases can find their way into the school-room through the hall. The vaults are said to be emptied quite frequently in the summer and disinfected, but it is utterly impossible to make the present arrangement safe, with any care which may be given it. The vault is common to both the upper and the lower privies, and the urinal below was full and running over.

#### BREWER.

##### *Excelsior Building.*

This new grammar and primary school-house, finished in 1887, is highly creditable to the village. It is of wood, two stories high, and has a school-room on each floor, besides suitable halls, stairways, well-arranged wardrobes and a recitation room. The general arrangement and finish are good but there are a few faults in the plan.

The greatest fault is that the rooms, planned to seat seventy or more pupils, were built with no arrangements whatever for ventilation, except that perilous kind which we are enabled to get through the windows. The windows, however, are finished up with double windows, and an intelligent care and constant watchfulness on the part of the teachers may do much to remedy the fault. Another defect results from a little parsimony in the use of glass. Three windows only are placed on each side of the room, which being about 36 feet long leaves quite wide spaces between the windows.

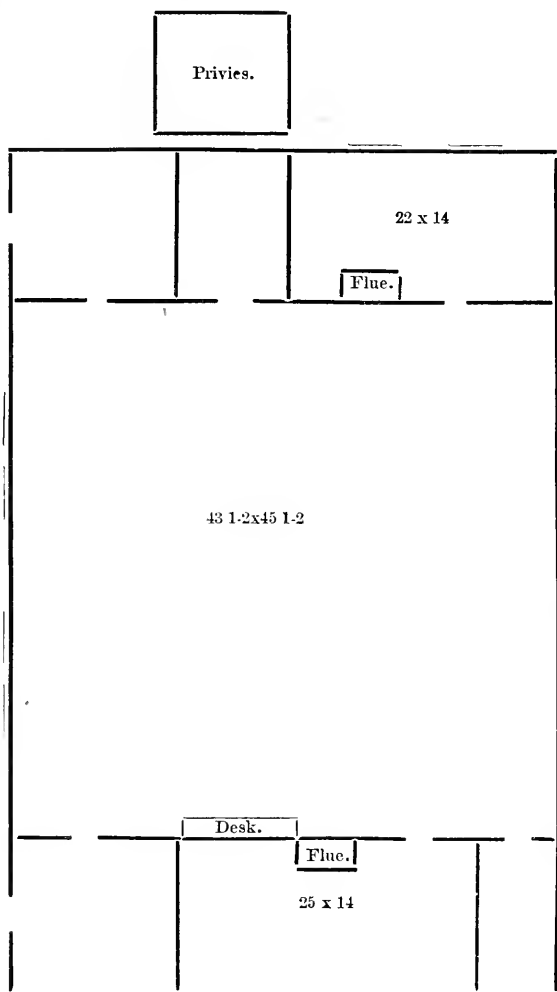
The rule which claims that the amount of glass in the windows collectively, shall equal at least one-sixth of the floor space is not fulfilled. The proportion in these rooms is only one to ten and a half. With the same surface of glass the windows would have done more lighting, if they had been put up higher. The window-sill is only two feet and nine inches from the floor. Steam heating by direct radiation is employed. In the basement the same kind of trough closets were found as are in use in the Bangor schools, and they appeared to be kept in excellent condition.

#### BRUNSWICK.

##### *High and Grammar School Building.*

This is a two-story, brick building, erected in 1851, having essentially the same plan on both floors, that is, a hall, stairway and recitation room in each end, with an intervening large and almost square room, measuring  $43\frac{1}{2} \times 45\frac{1}{2}$  feet. Large, square school-rooms of this kind are always difficult to light, and these are certainly not well lighted. On the north side of the room, at the scholars' left, there are only two windows; on the south side there are four. As originally arranged the pupils sat facing the windows on one side; but the injurious effects upon the eyes were made manifest, and led to a transposition of the desks of the teacher and the pupils. The amount of window surface which is in use is very insufficient to properly light the rooms, and the ratio as compared with floor surface is not more than one to thirteen. The heating in both rooms is by direct radiation from steam pipes. Ventilation is provided for, or thought to be provided for, by the use of a patented article known as Robinson's ventilator. This apparatus was found in use in all the schools which were visited in Brunswick, excepting the last. It consists of an opening in the ceiling two or three feet square, with which a wooden shaft of the same dimensions connects, leading to a galvanized iron or zinc arrangement on the top of the building. This shaft is divided into two parts by means of a partition, down one side of which the fresh air is expected to come, and up the other side of which the foul air is supposed to go. In these rooms there were no facilities for climbing to the ceiling to test the currents, but in two of the rooms in the Center street primary and intermediate school building, the current was found to be upwards in both divisions of both ventilators which were tested. There is probably no constant

inflow of pure air through any of these ventilators, and it is doubtful whether they ever act as fresh air inlets excepting when the wind is in a favorable quarter to drive the air down them. The building for the privies is close to the west end of the school building, but



HIGH AND GRAMMAR SCHOOL, BRUNSWICK.

isolated from it by an intervening space of sixteen inches through which the air can freely pass. No underground vault is used, but a plank box above the surface permits frequent removal and cleaning,

and it is said that considerable care is taken to keep the arrangements from becoming offensive.

*Center Street Primary and Intermediate School.*

This is a four-room brick building. The plan of the two floors is alike, having a central hall extending across the building from front to back, and flanked on each side by a school-room, 24x31 feet in size. Each room has two windows on each side, that is, on the scholars' right and left, and two mullion windows at the back. The rooms are heated by wood-burning stoves. Each room is supplied with a Robinson's ventilator, the workings of which are mentioned in the description of the high school building. The test for carbonic acid was made in one of the rooms on the second floor, where thirty-five pupils were present, and showed twelve parts in the ten thousand of air.

*Union Street Primary School.*

This building is of brick, two stories in height, and contains on each floor a school-room, 30x33 feet, besides halls, stairways, and a recitation room. Each staircase is long, steep, and for little ones, dangerous. The rooms are lighted with two windows on each side, and, after the prevailing style in this town, with two mullion windows at the rear of the scholars. The amount of glass surface used would be quite satisfactory, if the rooms were of a shape more favorable for lighting and the windows were placed higher. Particularly in rooms of this square shape, there is a great advantage in placing the windows high, having the window sills three and a half or four feet from the floor. In this building the window-sills are only two feet and two inches above the floor. Both rooms are warmed with stoves. A ventilator is in use like those found in the high school and Center street primary and intermediate schools. The blackboards consist of a preparation on the plastered walls, and are in a dilapidated condition. The privies are in a small, two-story wing, built against one corner of the building, and as a part of it. The entrance to it from the second floor is directly from the school-room. The lower part is entered from the outside.

*Pleasant Street School.*

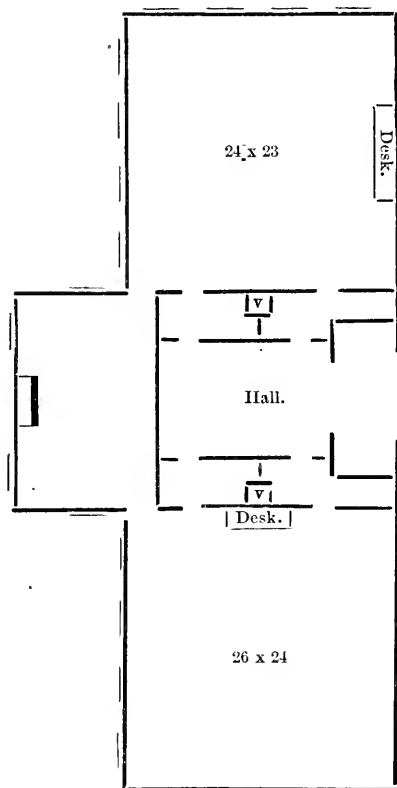
This building was completed in 1887, and shows a very careful studying of the problems of school-house architecture, especially from a sanitary point of view. Altogether, perhaps, it comes as

near being a model school-house, as any which can be found in this State. The idea of the building committee was to make the plan and construction conform closely to the requirements of the modern rules for school-house building ; and, while retaining the essentials of interior arrangements, they have discarded some of the external non-essentials which delight the architect's eye, and which the architect had included in his plan. The external elevation presents, therefore, a rigidly simple style of architecture, though nothing unpleasant. Other towns, which are under the necessity of retrenching in the direction of either the essentials of comfort and healthfulness, or the non-essentials of exterior decoration, would do well to decide as was done in this case. Ten thousand dollars were appropriated by the town for the construction of this building ; but the actual cost, when the building was completed, had amounted to only about five thousand dollars. By reference to the plan, it will be seen that there are two principal school-rooms, with a central hall and clothes room placed between, and at the rear and between the school-rooms, a recitation room or an "overflow" room, as the building committee called it.

One of the school-rooms is 24x23 feet and the other 26x24 feet. In each, the arrangement of the teacher's desk and windows is such that the light comes from the left and the rear, the light coming in one of the rooms from the north and east, and in the other from the north and west. In the front of the building are two narrow windows in each room. In one of the rooms, these are on either side of the teacher's desk ; in the other, they are at the right of the scholars. They were put in for achitectural effect rather than for utility. They are of the width of only one pane of glass, but run to the height of the other windows. In the room where these windows throw their light directly into the eyes of the scholars, they are objectionable in proportion to their size, but ordinarily they are covered with dark brown curtains. The principal windows extend from three feet above the floor to very near the ceiling, and give a very satisfactory illumination. The glass in these principal windows equals about one-fourth of the floor surface. This arrangement of lighting gives two good wall surfaces for blackboard use, and the teachers, though at first complaining that the blackboard surface would be insufficient, have come to conclude that it is ample.

A furnace, set in the basement, half way between the two rooms, sends a warm air duct to each, and discharges through a register 23x15 inches. The escape of foul air is provided for by two registers

placed on the inner wall of the school-room, one close to the ceiling, and one near the floor. The lower one is intended for use in cold weather while the upper one is closed, and the upper one for the escape of warm air in hot weather. The teachers, however, did not appear to be instructed in regard to their management, and consequently, the lower one was found closed, while the upper one was open.



PLEASANT STREET SCHOOL, BRUNSWICK.

Each of these foul air registers is twenty-three inches square, and it communicates with a metal lined shaft, about thirty inches square. Passing into the attic, it enters a central shaft, which extends through the roof, terminating in a ventilator, the sides of which are protected



by lattice work. These foul air shafts are unheated, but, with the upper register closed, and the lower one open, there was found to be more movement of air through the register than was expected under the circumstances. The school had not been in session during the day. The external temperature was about 34°, and that of the room only 60°. Apparently a very mild fire burned in the furnace, and fresh air came in through the warm air register at the rate of 150 feet a minute, and passed out through the foul air register with exactly the same velocity. Evidently these foul air flues have but little aspiratory power and their utility is dependent upon the plenum movement. But, in addition to these registers, the school-rooms have a considerable auxiliary foul air removal in a register in the recitation room. This register is 17x11 inches, and is set in a ventilation flue which is heated by the furnace smoke-pipe. The movement of air through this was found to be 330 feet a minute.

Several improvements might be made in this plan. An ample central brick shaft, placed midway between the two registers, divided into three parts by iron partitions, the central part for a smoke flue, and the lateral flues for the ventilation of the rooms, would have given the advantage in a cold climate of a heated flue in the center of the building, and would have given a steady independent power for the extraction of foul air.

Another change, which some would prefer, and which would diminish the cost of construction, would be to throw the whole space, now occupied by hall and four small clothes rooms into one larger hall. Then the wardrobes might be taken off from the hall, as they are in the Bangor high school building, by means of a matched board partition, running only half way, or a little more, to the ceiling. In this way, with a small warm air register in the hall, the clothes could be dried and ventilated much better than is now possible.

#### CUMBERLAND CENTER.

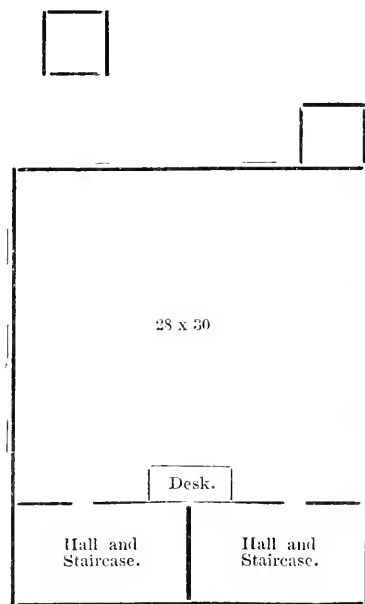
The village school-house is a one-story brick structure, built about thirty-five years ago. The school-room is 30x26 feet, not well lighted, the windows being too small and too few. They are placed two on each side and two at the back. The heating is by means of two wood stoves in the front corners of the room, and the smoke-pipes run overhead, one to each of two chimney flues in the rear of the room. The old-time notion of what constitutes a proper ventilating arrangement is shown by a foul air register of only nine by five inches set in each chimney shaft near the ceiling, and close by

the side of the hole which receives the smoke-pipe, but I could not learn whether there is a foul air flue in the chimney separated from the smoke flue or not. The privy vaults were found in a bad condition; they are fortunately placed thirty feet from the school-house. The old fashioned wooden benches are in use in the school. It would be fortunate for the village if it did not have this school-house, so that it would be obliged to build a better one. One very common cause of the unhealthfulness of these old brick school-houses is that they were built directly upon the ground, without any damp-proof course in the foundation walls, or other safeguards to prevent the rising of the soil moisture and the saturation of the walls. Such buildings are sure to be damp and dangerous.

#### DAMARISCOTTA.

##### *Grammar School.*

The building is a two-story brick one, but only the upper room is now used for school purposes. The room is 28x30 feet, with a ceil-

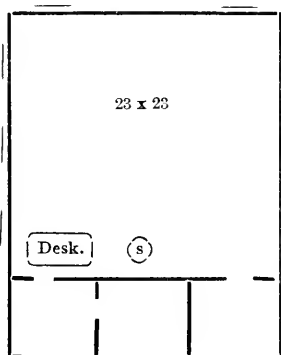


GRAMMAR SCHOOL, 2D FLOOR, DAMARISCOTTA.

ing only ten and a half feet high. The lighting is from the sides and the rear. The heating is done with wood stoves. There are no ventilators excepting those dangerous ones, the windows. There is, however, a fine example of a sham ventilation system. Two registers, only 12x7 inches in size, are set in a wooden shaft, which is not heated. There is no legitimate fresh-air inlet. The air is probably bad in this school-room, for the average daily attendance is fifty-one. The boys' privy is about twenty feet from the school building, and that for the girls abuts against the rear basement wall, and is entered through the basement. The gases from the vaults escape freely into the basement, and, consequently, pass up into the school-room more or less. The vaults of the privies were extremely filthy, and the ground around was in the same condition.

*Village Primary School.*

The one school-room in this building is square, measuring twenty-three feet each way, and having a ceiling only a little more than nine feet high. The windows are composed of the old-fashioned, 10x8 lights, and their combined surface is not quite up to the stan-



PRIMARY, IN VILLAGE, DAMARISCOTTA.

dard; but there is a partial compensation for this deficiency in the height of the window-sills. The room is heated with a wood stove. There are no means for ventilation, excepting the use of the windows. The average daily attendance in this room is forty. In this school, as well as in many others, there is shown a want of regard for the moral health of the children by the lack of separate privy arrangements and of cleanliness.

## FREEPORT.

*High School.*

This is a two-story, wooden building, erected in 1873. It was undoubtedly intended to make it a suitable building for school purposes; but, in its original plan and present arrangements, there can be found but little to commend. A reference to the plan of the building will show the justice of at least some of the following strictures:

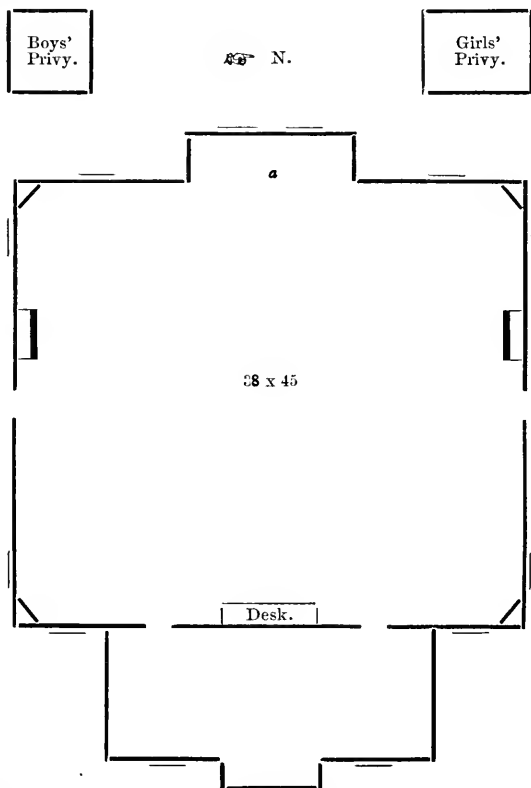
The school-room is about 38x45 feet. The first thing which attracts attention is the ill-arrangement as regards lighting. We have not only the troublesome cross lights from both sides and back, but also that position of windows which is generally, and ought to be universally condemned, windows in front. Turn which way the pupils may, to avoid the glare of a window, there is no windowless wall to rest the eyes upon. In addition to this disregard of the proper placing of windows, there is a decidedly deficient quantity of light. In the lower room, the teacher's desk is at 'a', and the pupils' desks are so arranged that each pupil has his side to the teacher, and faces the middle of the room and the opposite wall and its windows. This secures no improvement in the character of the lighting.

The heating of the building is said to be deficient, and it is done by means of two furnaces in the cellar, placed on each side, on a line drawn from chimney to chimney. Each furnace has a separate fresh-air box, taking air from only one side of the house, the intake for the south furnace being dangerously near the boys' privy vault, and the one on the north side being near enough to the other vault to create a suspicion of danger. The arrangement of the fresh-air boxes would make it very probably that a reversion of current would occur, when the wind is in certain directions. There are two warm-air registers in each room, and one in the class-room on each floor. The latter are connected with the furnace by a long reach of pipe, which runs nearly horizontally too long a distance in the basement to permit us to expect the air to pass through it in the right direction at all times, when the wind is in the east.

There are two foul-air registers, 14x10 inches, in each room, one in each of the two flues into which the furnace smoke-pipe goes, and these two are efficient as far as their size permits; there is also a register in each corner of the room which does not go into a heated flue, and which, therefore, is not of much use. All these registers

are placed near the ceiling, a position which is favorable to the rapid escape of the fresh, warm air soon after it has risen to the ceiling, and before it has fallen to the breathing line so as to be utilized.

The privies are arranged for convenience, and this is always a weighty consideration, when it can be secured without the loss of a more important requirement, to wit: healthfulness. These out-buildings in this case are only twelve feet from the school-room, and have vaults three or four feet deep, walled up with stone, but not cemented,—a kind which is not like to be emptied often, and which cannot in any way be properly cleaned out. They are on the west side of the house, whence the prevailing wind may bring their unhealthful gases of decomposition into and around the house.



HIGH SCHOOL, FREEPORT.

Another danger from this proximity is of a two-fold character. The cellar bottom is lower than the bottom of the vaults; conse-

quently the cellar has a tendency to act in the capacity of a drain for the vaults, and there is the question whether the intervening twelve feet of soil is now, after fourteen or fifteen years of constant service, in a condition to filter or to oxidize completely, and thus to render harmless, the liquids which may come through into the cellar, or into the soil which immediately underlies its floor. Still another undesirable probability. The healthfulness of a dwelling-house or a school-house is affected in no little degree by the character of the ground-air. Particularly in the winter, when the house is artificially heated, there is a strong movement of this ground air into the cellar or basement and into the house. It is, therefore, always desirable to have this ground air contaminated as little as possible. In the case of this building there is a very obvious source of contamination of the ground-air.

The school-yard is ample, and the school has a well of its own, which is so situated that the water is probably good. The school was not in session when the house was inspected.

#### *Grammar and Primary Schools.*

This is a two-story, wooden building, with the grammar grade on one floor, and the primary on the other. The rooms are nearly square, and are lighted from the sides and back, with the windows placed too low to get the best lighting, with the amount of glass used. Heating is by means of box stoves, placed in front, the pipes running overhead to the chimney flue at the rear. There are no arrangements for ventilation. Wooden blackboards are used and the painting is too smooth, so there is a troublesome reflection from their surfaces.

GARDINER.

#### *High School.*

This, a two-story brick building, having one school-room about thirty-six feet square on each floor, besides accompanying recitation rooms and halls. The plan is very nearly the same in both school-rooms. On each side of the room there are three windows and the same number at the rear, the middle one of which is a mullion window. The heating is accomplished by means of two furnaces in the basement, each of which sends a warm air pipe to each floor above. The furnaces are said to warm the rooms sufficiently at all times. The fresh-air boxes which supply the furnaces are made of boards. They take their supply from basement windows. One of them is too small, being only 11x9 inches, inside measurement. The school-

rooms have three foul-air registers on each side, two near the floor and one near the ceiling. On each side of the room where these registers are set, there is a chimney-stack, consisting of three separate flues, the middle one of which was apparently intended as the flue for the furnace smoke-pipe, while the two outer ones in each stack receive the foul-air registers. Instead, however, of running the furnace smoke-pipes into these middle flues, which are near the furnace, for some reason or other the smoke-pipe traverses the basement a considerable distance to enter another set of flues at the north end of the building; consequently, the ventilating flues for the main school-rooms remain unheated, and the foul-air apparatus is inoperative. No movement was found through any of the foul-air registers, excepting one, and its rapidity in this case was only eighty feet a minute. The amount of carbonic acid in ten thousand parts of air was found to be sixteen in the lower room. The average daily attendance is about fifty in each room.

Out-door privies are used, which are situated about twelve feet back of the main building.

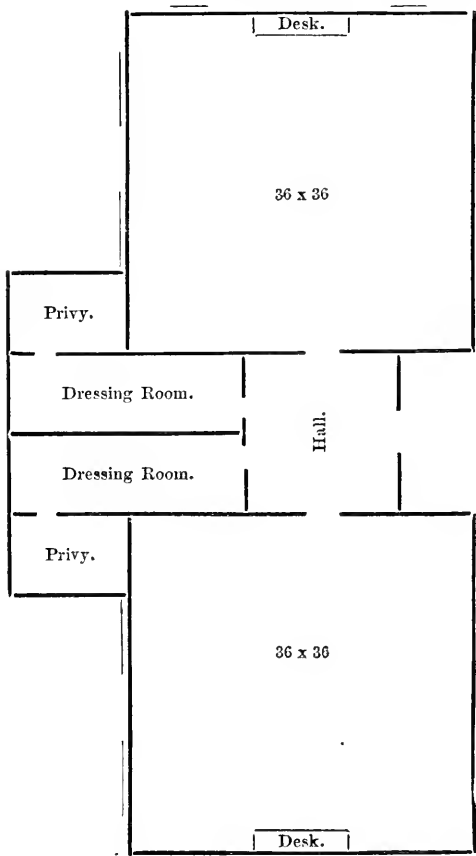
#### *High Street Grammar School.*

This is a two-story brick building, having the grammar school on the second floor and the intermediate on the first. The size and plan of the two rooms are essentially the same. The rooms are 35x36 x nearly 13 feet. They are lighted by three windows on each side, and four at the rear of the room. There is a foul-air register in the chimney flue near the ceiling at the rear of the room, and in the second-floor room, a register, 11x9 inches in size, opening through the ceiling into the attic. The ventilation flue is warmed by the smoke pipe from the furnace; each room is heated by a furnace of its own in the basement. Neither of these furnaces has a fresh-air inlet; consequently, the cellar air is supplied to the schools for breathing purposes.

Partly on account of this, and partly on account of the insufficiency of the foul-air extraction, a larger proportion of carbonic acid was found in the grammar school-room than has been found in any other school-room, it being 29 parts in the ten thousand. The test of the air was made near the end of the afternoon session. The average daily attendance is 70 or more. Privies are in use. They are placed about fifteen feet from the school building; their condition is not cleanly.

*Central Street Grammar School.*

This is a new brick building of about 90x36 feet inside measurement. It is only one story in height. The central part is occupied by an ample hall and by dressing rooms, one for the boys and one for the girls. On each side of the hall is a school-room, square in shape, measuring 36 feet on each side. The outside door, and the doors leading from the hall to the school-rooms are wide.



CENTRAL ST. GRAMMAR, GARDINER.

The lighting is from the sides, there being on each side of the room two triple-mullion windows. The lighting would be accepted generally as satisfactory, but there is a somewhat smaller ratio between window and floor surface than there ought to be, on account of the rounding off of the tops of the windows for architectural effect.



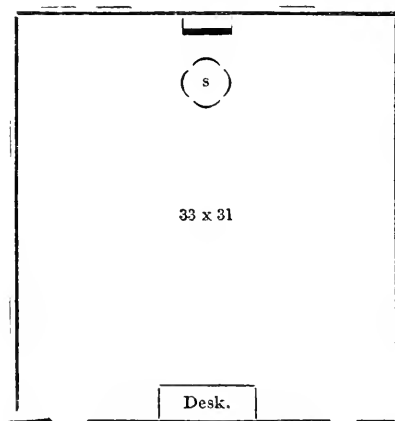
Another effect which is pleasing, as the visitor enters the rooms, comes from two stained-glass windows, which are placed one on each side of the teacher's desk and seven feet from the floor; but to the pupil who has to face constantly the light from them, especially in the sunny end of the building, it is not so pleasant, and, in the southern room a cloth curtain has been placed over these windows, apparently to mitigate the glare of the light from them.

The rooms are heated by hot-air furnaces in the basement which deliver the warmed air through two large registers in the floor in front of the teacher's desk, one on each side. The foul-air registers are placed in the ceiling in the back part of the room.

The position of the privies can be seen by reference to the plan. They are too near the school-rooms, and the testimony of the teachers is that they are troublesome, especially in warm weather. Architecturally this is a very pleasing building, and, with the exception of a few faults, some of which may be remedied, it is a good one.

*Lincoln Street Intermediate and Primary School.*

The building is a wooden structure, two stories high. The first floor is occupied by the primary school, and the second by the inter-



SCHOOL-ROOM, LINCOLN ST PRIMARY, GARDINER.

mediate. The plan of the two rooms is essentially the same. The arrangement of the windows is hardly to be commended, for on each

side of the house, which is 33 feet in length, there are only two windows, with a wide space between. The deficiency in the lateral lighting for the scholars in the back part of the room is removed by four windows at the rear. The heating is by a ventilating stove, which is jacketed, and has a fresh-air inlet, which discharges the air beneath the stove and within the outer casing. I am not sure as to the success of the working of this particular pattern; but, when properly arranged, these ventilating stoves work exceedingly well, and the principle involved in their construction is worthy of being adopted in more of the school-houses in the State, where the heater must be placed in the room. Registers are put into the two front corners of the room close to the doors, apparently only for ornamental purposes, as they lead merely into the space between the walls. The house needs better arrangements for extracting the foul air, especially in the primary room, where the larger number of pupils attend.

*Winter Street Primary.*

This building is quite an old, one story brick structure, containing but one room. The cellar used to be very damp, but the dampness is not so apparent, since the cellar was cemented. The lighting is very good. The warming is by means of the furnace in the cellar, which, having no fresh-air box, supplies cellar air to the room above. This is a serious fault which ought to be remedied. There is no provision for the removal of foul air, excepting through a 15-inch circular register into the attic.

*New Mills School.*

This is an old wooden one story building formerly containing but one room, measuring 32x34 feet. This space has been divided by a partition into two rooms, one of which is eighteen feet and the other sixteen feet in width. The wider, the intermediate room, is lighted from the rear and one window in front; the narrower, or the primary room, has light from the left and rear, but there is no window in front. The heating is by wood stoves in the room. Fresh air comes through the windows, when they can be kept open, and through the cracks, of which there appear to be an abundance. Wolpert's tester, however, showed twenty-two parts of carbonic acid in the air of the primary room. There is in this room a serious degree of crowding, the average daily attendance being about forty-five pupils, to forty-two desks. This is a very unsuitable building for the district,

and should be replaced by a better one, which, I hear, is proposed by the town.

#### LEWISTON.

##### *High School.*

The building for the high school is a brick structure, two stories high, with two rooms on each floor. The plan, arrangement of lighting, etc., are essentially the same on the two floors. The rooms are nearly square, being about  $34 \times 38\frac{1}{2}$  feet in size. The two rooms in the south-east half of the building are lighted by four windows in the rear, three to the left and one in front of the scholars. In each of the two north-west rooms there are three windows on each side, and two in front of the scholars. The windows in all these rooms are placed too low to get the best effect from the light which they give. There is no place left in these rooms for the blackboards to be placed, where they can receive a satisfactory lighting.

The rooms are heated by means of steam pipes around their walls. No provision is made for supplying fresh air to the school. For the removal of foul air, one or two registers are placed in each room near the floor, but as their size is only  $10 \times 8$  inches, they would be more in place in a family sitting-room, which is occupied by a few individuals, than in a school-room, containing from forty to fifty pupils. As the most of these registers do not communicate with a heated flue, the movement of air through them is constant neither in direction nor velocity. The air was moving through the register back of the teacher's desk at the rate of 330 feet a minute, but it was downward instead of upward. In the south-east room on this second floor, the register in the north corner showed a movement of air through it at the rate of 130 feet a minute, when the doors were closed, and at the rate of 360 feet when they were open. In the same room there was a movement of only 80 feet per minute through the register on the south-east side.

The air was tested in only the two rooms on the first floor; and it may be said that, with the same number of pupils present, and with other conditions the same, the air on the first floor of a school-house is almost always found to be better, as regards the amount of carbonic acid present, than is the air on the second floor. With forty-five pupils present, there were found twenty-two parts of carbonic acid in ten thousand parts of air in the north-west room, and twenty parts in the south-east room, results indicating a very bad atmosphere.

The water-closets in the basement do not have a sufficient flush, and are not odorless. Changes are needed in this direction. In this building there is but very little to commend, and much to find fault with. The shape of the rooms, the lighting, heating, ventilation and plumbing all are faulty.

*Bates Street School.*

This school building is of brick, and is built according to the old fashioned compact style, with four rooms each on the first and second floors, and two on the third. These rooms average about 26x28 feet in size, half of them being lighted from the rear and the left, and the other half from the rear and the right side. The building is warmed by means of four warm-air furnaces in the basement. Each furnace has a fresh-air box, which takes the outer air from a basement window, but these fresh-air ducts are faulty in that they are not tight enough to exclude the cellar air. They are made of inch boards, and, through their considerable length, as they extend across the basement, probably considerable of the cellar air, which is not of the best quality, is sucked in. The inside measurement of these fresh-air ducts is about 14x15 inches, and one of these is intended to supply air to three rooms and half of the hall. Another one supplies three rooms and helps on the hall; a third is for the use of three rooms; and the fourth goes to one room and the halls. With the rate of flow which is usually found in such fresh-air inlets, a very little calculation enables one to say that it is impossible to draw the requisite amount of fresh air through these flues.

The provisions for removing the foul air from the rooms consist of two registers in each room, one near the ceiling and one near the floor, set in brick flues, which pass up between the rooms of each pair, and are warmed by the furnace smoke pipes; but, for some reason, there was found to be practically no movement of air through any of the foul-air registers in the rooms on the second and third floors. On the first floor, in Room 9, the velocity of movement was 145 feet; in Room 10, the same; in Room 11, 125; and in Room 12, 185 feet per minute. At the time of the observations there was a mild wind from the west, and the temperature of the external atmosphere was about 35° F. No test was made of the air in the rooms, but there is no doubt that ordinarily it is not good. The water-closets in the basement are of a very unsuitable and unsafe kind to place beneath the school buildings, especially such as

have so direct a communication between the air of the basement and that of the school-rooms, by way of the fresh-air and warm-air ducts, as there is in this building. The closets are of the long hopper variety, with only a mere dribble of a flush, and the traps are constantly clogged with fecal matter. The seats and the wood work are of the most clumsy description, and very much less of it would be an improvement. Around the closets and in the basements generally, there is considerable smell, which is not a guaranty of safety. The four furnaces in the basement heat its atmosphere highly; and, with the prevailing sanitary arrangements, it would be safer for the surplus heat to be conducted into the external atmosphere, than for the expansion to force it into the rooms above.

*Oak Street Primary and Intermediate Schools.*

These are two old wooden buildings, each two stories in height, which are not suitable for the purpose for which they are used, and which, at an early day, the city proposes to replace by a new and better house. In one of the rooms, the desks of the little ones are so placed that they face the windows, and, still worse, the windows look towards the south. An arrangement more dangerous than this for the eyes of the scholars could hardly be planned, even with a spirit of malignity.

*Lincoln Street Primary.*

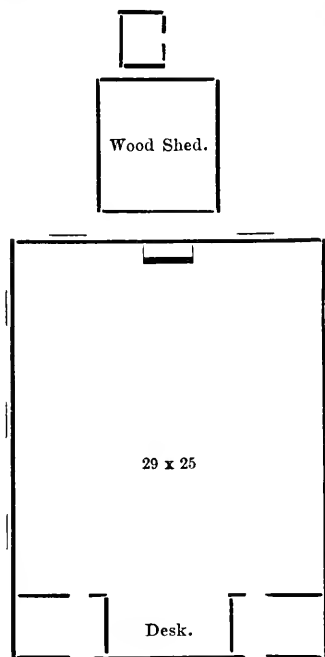
It consists of three buildings, standing near together, the largest one having two rooms on each of the two floors, the others having one school-room on each floor. The rooms in this building are heated by means of a furnace in the basement. Provision for the exit of the foul air was made by cutting off the the two back corners of each room, and inserting registers into the cold flue thus made, one near the ceiling and one near the floor. Two of these registers on the second floor were tried with the air metre; but, as one would expect, there was no movement of air through them. In the lower Lincoln Street school building, the lighting is very bad, there being only two mullion windows on each side, and these are placed very near the corner; consequently no light is admitted directly into the central part of the room, where most of the scholars sit. The seats are so arranged at the long tables, that, if each scholar may not have much light on his work, he may have some at least directly before his eyes. The heating in this building is by means of wood stoves.

The other smaller building, the one nearest to the canal, is of the same plan as the one just described, excepting that there is a different arrangement of the desks, which, with the unreasonable kind of lighting which the house has, cannot be made satisfactory.

## NEWCASTLE.

*District No. 2.*

This is a mixed school, and the building is a one-room school-house. The room, 29x25 feet, is of a convenient shape and size for lighting, and the lighting is very good, excepting as regards one window, which is back of the teacher's desk and in a position to be



SCHOOL HOUSE, DIST. NO 2, NEWCASTLE.

injurious to the pupils' eyes, especially as it looks to the south. This manner of economizing space by placing the teacher's desk between the entries, so that to light it a window will be needed at the teacher's back, is not to be recommended. If the two windows

at the rear had been placed upon the sides of the house, and the window in front had been omitted, the room would have been very nicely lighted so far as the scholars are concerned. The heating is by means of a wood stove, and the pipe runs overhead to the chimney at the rear of the room. There are no arrangements for ventilation, excepting through the windows.

*District No. 14.*

This is another one of the old brick school-houses, and it is built upon a plan very nearly like that of the preceding building. It is heated in the same way, and, like it, has no arrangements for ventilation. The two windows in the rear of the room are omitted, and also the one in front of the pupils. Another window on each side would improve the lighting, and supply a deficiency in the amount of light received in the room in cloudy weather.

OLDTOWN.

*High School.*

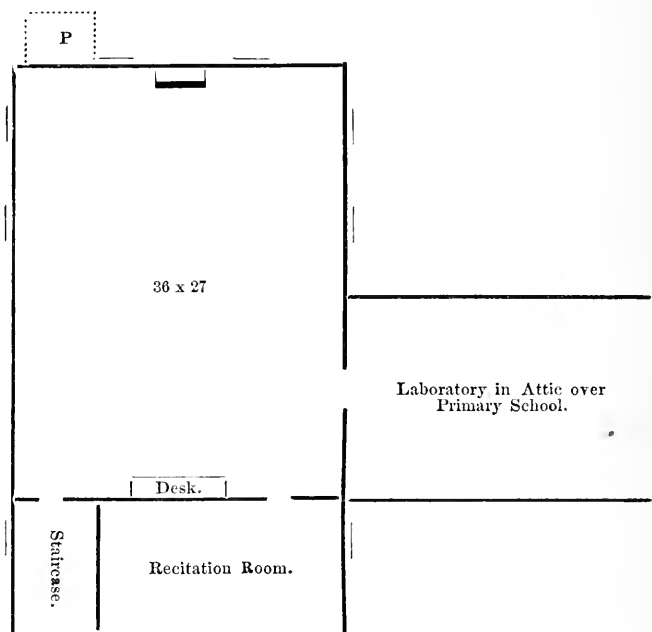
This is quite an old, two-story structure, the lower floor of which is used as a wood-house and furnace room, the second floor for the school-room, which is  $36\frac{1}{2} \times 27\frac{1}{2}$  feet on the floor, with a good height of ceiling. The windows are few for a room of that size, but are quite large, so that, as far as the scholars are concerned, the deficiency of light is not very noticeable. As will be seen by reference to the plan, the lateral windows are placed so far back that it leaves the teacher's desk in a badly lighted place.

There has always been much difficulty in the warming of the room, and, about a year ago a new furnace was put in on the lower floor; and, though the furnace might be judged to be of ample size, there is still complaint that the heating of the one room above is not satisfactory. An inspection of the arrangement of the furnace in the basement shows that the fresh-air box or duct, which takes air from a window, is only  $10 \times 7$  inches in size, and this is expected to furnish air for the two large warm-air pipes, 12 or 14 inches in diameter, which go to the registers above.

It would be good business policy for the manufacturers of warm-air furnaces to give explicit directions in regard to the proper setting of their heaters, and to insure, as far as possible, the construction of the fresh-air inlet of sufficient size to permit a free circulation of

air through the furnace and the warm-air pipe. No matter how good a furnace may be bought, it is possible to destroy entirely its efficiency, as was done with this one.

There are no arrangements for the removal of foul air from the room, excepting its accidental escape through cracks and crevices. The average daily attendance is sixty-four, and, during the sessions of school, the air must be vitiated by the products of respiration alone; but, in addition to this source of air pollution, which is found in all school-rooms, there is another very serious one in this. The



HIGH SCHOOL, OLDTOWN.

privies are built against the back end of the building, and the loose door, which is no safeguard against the gases from the vault, permits their free escape into the furnace room. The vaults have been in a very bad condition, and have hitherto been cared for only at infrequent intervals; but the local board of health has now taken the matter in charge, and will insist upon removal at stated, but rather too long, intervals. In the furnace room the privy smell is overpowering; and the furnace, insufficiently supplied with fresh air, is drawing in the dangerous gases at every joint, and through the



long seams of the fresh-air duct, which is made of inch boards. Further than this, some of the boards of the boarded-up window, from which the fresh-air duct takes its origin, were knocked off, letting the vile air of the furnace room out where it can be sucked directly into the fresh-air inlet. The smell from this furnace room comes up the stairway so strongly that the door has to be kept closed. The pupils complain much of the odor in the school-room, and the principal has tried to have a different order of things, but unsuccessfully.

Such filthy conditions could not fail to affect the school injuriously, and there appears to be sufficient evidence that it has been quite a prolific source of sickness. The principal has noticed that, at the opening of a new term of school, he feels very well during the first two weeks, or nearly that length of time, and then he almost invariably has a feeling of general weakness, which reminds him of the premonitory symptoms which he felt in the early stage of typhoid fever, nine years ago; and, about two weeks after beginning the last two terms, he has had a crop of boils on the back of his neck, with the usual feeling of general debility. Many of the students have been similarly affected, and the record of the absentees on the teacher's register is quite an interesting study. I had the privilege of examining that part of it which goes back over the past four years, and, taking the absention as some indication of the amount of sickness, it is very noticeable that during the first two weeks of each term, there has been but very little illness, and then there is a sudden increase in the number of absentees, shown by the lines of black marks opposite the names. Some of these lines were of great length showing that the pupil, against whose name they were placed, had not returned to the school for several weeks. I was told that many of these scholars had had fever, and that, besides the number whose sickness was serious enough to cause their withdrawal from school, there was a larger number who still persisted in their attendance, while sick or half sick, for the reason that absence reduced the rank to zero. Further statements of the principal were that, four years ago, during the spring term, some were absent on account of typhoid fever. Two years ago, during the fall term, several students had typhoid fever, beginning about two weeks after the opening of the school. Last spring nineteen became sick at one time, their sickness beginning about two weeks after the opening of the school, and eleven of these were sick for a considerable time.

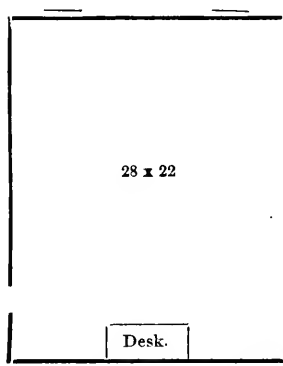
The teacher has noticed that there is a marked difference in the ease with which he and the scholars can work in the morning and later in the session.

*Primary School adjoining High School.*

This is a small, one-story ell of the high school building, and under its shadow on the northern side. Its one room, without entry, is 22 x 21 feet in size, and it is very insufficiently lighted by its three windows, two on the right and one on the left. The room is heated with a wood stove, and there is no provision for ventilation.

*Grammar School on Brunswick Street.*

This is an old and dilapidated building which was locked, and only one room of which was inspected, with the aid of a boy admitted



ROOM IN BRUNSWICK ST. GRAMMAR SCHOOL, OLDTOWN.

through a window and by looking in. This room was 28 x 22 feet in size, with a ceiling only eight and a half feet above the floor, heated with a wood stove and unventilated. There were seats for fifty-six pupils in the room. The windows are arranged in the very bad fashion which is shown in the diagram, two of the windows being directly in front of the scholars.

*Primary and Intermediate Schools, Front Street.*

This is another one of the old, wooden, two-story school-houses, with low ceilings. It is not well lighted. The window sills are only

two feet, four inches from the floor, and the windows are placed all around excepting in front. A wood stove heats the room, and the wooden blackboards are placed between the windows.

*Grammar and Intermediate Schools at Great Works.*

This is a new, two-story school-house built of wood. The school rooms are 31 x 29 feet in size, and, according to the prevailing style of school-rooms in this town, the ceiling is rather too low, being only ten feet in height. The amount of glass used would, perhaps, tolerably well light the room, if the ceiling had been two feet higher, so that the window sills might have been three and a half feet from the floor instead of two and a half, as they now are. A wood stove heats the room, and there is no way of ventilating, excepting through the windows. The privies are situated in the wood-house, and do not command enough of the respect of the scholars to keep them from filling the vault with stove wood.

ORONO.

*High School.*

This is a wooden structure, having a high school on the second floor, and the grammar school on the first. The high school has a large, nearly square room, 39x36 feet. The lighting is not well arranged, and is somewhat insufficient in quantity. The room is heated with a warm-air furnace in the basement, but the fresh-air box is insufficient in size to give the best results. Ventilation can be secured only by opening the windows. Water is supplied from a well on the school-house lot, which is only two or three rods from a privy and pig-pen, and on lower ground, so that it cannot fail to receive drainage from these undesirable sources. The well is only ten feet deep and had at the time of examination seven feet of water in it. This well should be closed. In the basement they have the same arrangement of flushing trough-closets as are in use in Bangor. At the time of examination, there was an obstruction in the soil-pipe below, so that the flush was very imperfect.

The grammar school-room, on the first floor, is unsatisfactorily lighted from the two sides, and the provisions for heating, ventilation, etc., are the same as for the high school.

*Primary School No. 2.*

Though this school-house was built in 1828, its present condition, in many respects, is better than that of many of the later-built

school-houses. The one school-room is 30x25 feet, with a ceiling 13 feet high, and three windows on each side, which apparently have been modernized. The amount of window surface, as compared with floor surface, conforms very closely with the requirements of most modern authorities on school-house building, the ratio being nearly as one to six; but the windows are placed much too low. The heating of the room is accomplished by means of a wood stove, and provisions are made for ventilation by two foul-air registers, 10x8 inches in size, placed in the chimney flue back of the teacher's desk, the one near the ceiling and the other low down. The size of these flues is altogether inadequate to the work which is expected from them, but they are probably doing some good. No test was made of the rate of air movement through them. The old fashioned wooden benches are in use.

*Intermediate and Primary School near Railroad Station.*

This is an old wooden building having the intermediate school on one floor and the primary on the other. The plan and general arrangements are the same for both rooms. The rooms are 36x30 feet, with the ceiling rather insufficient in height, it being only eleven feet. The windows are of the same size and same number as in the preceding school building; but on account of a larger floor surface the amount of window surface becomes insufficient. As in the preceding house, so in this one, the windows are placed altogether too low, the sills being only two feet from the floor. Ventilation is also sought in the same way, by means of registers similarly placed and of the same inadequate size. The rooms are heated with a wood stove. Privies are in use, the vaults of which are not often cleaned on account of their inaccessible position.

PITTSFIELD.

*District No. 7.*

The building is a one story school-house, with its two rooms placed end to end. The entries are on the south side, and are taken out of the two adjacent corners of the school-rooms on that side. The rooms have the advantage of not having windows all around. There are three windows on each side, but none at either end for the scholars or the teacher to face. Heat is saved by having outside windows which do not open, and inside windows which are not hung on pulleys to open easily. Ventilation is sought by an opening through

the ceiling, into the attic, about two feet and a half by two feet in diameter ; consequently the conservation of heat which is effected by the double windows is annulled by the escape of heat into the attic through the hole overhead.

It may be remarked in this connection that the method of ventilation by letting the hot air escape through the ceiling, or near the ceiling, is objectionable in our cold climate, on account of the great loss of heat which it entails. In the form which we have presented to us in this building, we may well say that the height of the ceiling of the school-room has been removed from the place eleven feet and a half high, where the overhead plastering is to the ridge pole of the building, which makes the column of air in the school-room about twenty-five feet high instead of eleven and one-half. According to the law governing the movement of air in confined spaces, the colder air falls to the lower part of such enclosed space and the warmer air is driven upwards. Consequently, if the roof is tight, the movement of air through the hole in the ceiling tends to fill the attic with warmed air and the school-room with cold air. With an arrangement of this kind, a lake of cold air along the floor is very noticeable, and, as a medical correspondent in another town said, with reference to this kind of ventilation, "the little urchins would be thankful for the privilege of going aloft and hanging their chilled feet in the current of hot air ascending skyward." The same correspondent states that, in a room ventilated in this way during the cold weather of this current winter, he has been experimenting with regard to the difference in the temperature at different heights. The thermometers placed above and below, showed a difference of 40° F. with the ventilators open, and it was uncomfortably cold on the floor, the temperature there being not more than 40° F. With the ventilator (hole through the ceiling) closed, there was a difference of only from 10° to 12° F. between the temperature near the ceiling and near the floor, and the floor temperature was from 55° to 60° F.

The privies are too near the school-house (only six feet distant) and are not in a decent condition. Furthermore, they are on the west end of the school-house, whence, in summer, the prevailing winds must carry the undesirable exhalations through the open windows.

#### *District No. 4.*

This is a one-room, wooden building, which may stand as a representative of very many other country school-houses. The room is

29x27 feet, with a very fair height of ceiling for a school of this kind, nearly 12 feet. For heating it is warmed by a wood stove in front, whose smoke-pipe passes overhead into the chimney flue in the rear. It is ventilated(?) by a hole two feet square in the ceiling nearly over the stove. There are three windows on each side, which light the room fairly well, though, in cloudy weather, another window on each side would be an improvement. One thing seriously to find fault with is the attempt at economy in placing the teacher's platform between the corner entries. This necessitated putting a window in at the teacher's back, and consequently, in front of the scholars, an arrangement which should always be avoided. If the resources of the district were not sufficient to warrant the lengthening of the building a few feet, in order that decent entries and hat-and-cloak rooms could have been made, it would have been better to let the school-room run the whole length of the building, to have only outside doors, to place the objectionable window on one side of the room, and, with the saving in cost of construction, put an additional window on the other side of the house. This sinking of the teacher's desk between the two entries is not an advisable, hardly a real, piece of economy.

#### PORTLAND.

##### *High and Cumberland Grammar Schools.*

The building which accommodates these schools has the high school on the first and second floors, and the grammar school on the third. The building is about 140 feet in length, and 70 in width, irrespective of the wings on each side which contain the entrance halls, stairways and water-closets. On the first floor there are in each end two school-rooms, each about 29 x 36 feet in size, connected by wide, folding doors. A central hall, running lengthwise of the building, passes from one pair of rooms in one end of the building to the corresponding pair in the opposite end, and, on the east side of this central hall, there are a large hat room for the boys, the principal's private room, and a recitation room, which is now used as a general store room. On the west side are the laboratory and a large cloak room for the girls. Each of the four school-rooms on this floor is lighted from the back and one side, the lateral illumination being, in two of the rooms, from the left hand side of the scholars, and in the other two, from the right. The deficiency of light in these rooms is not very marked, but the lighting is not so good as it should be.

On the second floor, three recitation rooms are taken off across each end, and the larger middle portion of the floor is occupied by four school-rooms, which are compactly arranged without any intermediate hall. Each of these rooms is 53 feet long and 36 feet wide, and is lighted by four windows in the outer wall, the combined surface of which is only 1440 feet, only a little more than one-seventeenth of the floor surface of its corresponding room. In rooms which are not too wide, unilateral lighting has many advocates; but the width of room which can be effectively lighted by windows on one side does not exceed once and one-half their height above the floor. Thus, if the tops of the windows reach twelve feet above the floor, the lighting is not entirely satisfactory to a greater distance in the room than eighteen feet. By placing the scholars' desks nearer than usual to the lighted side, and leaving a wider walk on the opposite side the width of rooms with one-sided lighting may be several feet greater than the figure given, and still secure good lighting of the opposite wall. In the case of the rooms under consideration, however, the windows, about eleven feet in height, are supposed to throw their light into the room to a depth of thirty-six feet. The inner half of each of these four rooms is therefore very insufficiently lighted.

The corner recitation rooms are lighted from two sides, and the middle recitation rooms, of course from one side only. In one of the recitation rooms, the position of the teacher's desk should be transposed, so that the pupils may not be compelled to face a window which is now back of the teacher's table.

The heating of the building in all the rooms is principally by means of steam pipes placed around the walls. In addition to this, steam coils are placed in fresh-air boxes, for the purpose of moving the air for ventilating purposes. The boiler which heats this building warms also the Chestnut street school, by means of a steam-pipe carried underground through a tunnel. From what was said by the present janitor, it would appear that the heating power of the boiler is not equal at all times to the requirements. In the coldest weather, he said, the direct radiation pipes in the rooms and the indirect radiation coils in the fresh-air boxes, and the coils in the foul-air flues, cannot all be sufficiently heated at the same time.

The provisions which are made for the supply of fresh air to the various rooms consist of a series of ducts, in which are placed steam

coils to warm the air and accelerate its movement. These wooden fresh-air ducts or boxes are made of inch boards, are not air tight, but an attempt was being made at the time of the last visit, to make some of them less pervious by tacking cotton cloth over them and painting the cloth. They have their intake of air from basement windows, whence they pass a considerable distance horizontally near the ceiling of the basement, then upward to the rooms, in many cases a single air duct supplying several rooms.

On the east side of the basement one of these fresh-air ducts, 12 x 7½ inches inside measurement, goes to school-room 9 and recitation room 7 on the first floor. Another one, 20 x 14 inches, leads to school-rooms 1 and 3 on the second floor, and also to two school-rooms on the third floor.

Another, 14 x 4½ inches, supplies the boys' dressing-room.

The 20 x 14 inch duct on the east side, as stated, is supposed to supply fresh air for four rooms, namely, two of the large rooms of the high school and two of the grammar school rooms. This duct, if its calibre were equally divided, would afford a fresh-air inlet, 10 x 7 inches, for each of these rooms; or, dividing its 280 square inches among the average number (218) of scholars who attend in these four rooms, each has a very little more than one and a quarter square inches instead of about 24 square inches for each, as it is usually calculated it should be.

In like manner, on the other side another duct of the same size traverses the basement for a short distance, making three sharp angles, and is required to furnish air for the four corresponding large school-rooms on the west side of the building, two on the second floor and two on the third. All these fresh-air ducts are of insufficient size. The insufficiency of their size permits them to supply only a part of the air which is needed in the different rooms; their length, their tortuousness, and the manner of their distribution makes them still more inoperative. Subtracting from the efficiency of the ventilating scheme is a lack of careful supervision of the existing arrangements. Though not what they should be, these ventilating fixtures are worth something and should be encouraged to do their best; but, at the time the inspection was made, many of the outer openings in the basement windows were covered with snow. Some of the recitation rooms on the second floor receive fresh air through ducts which start from windows on the first floor, and these windows have to be raised to admit air into them. These windows were all

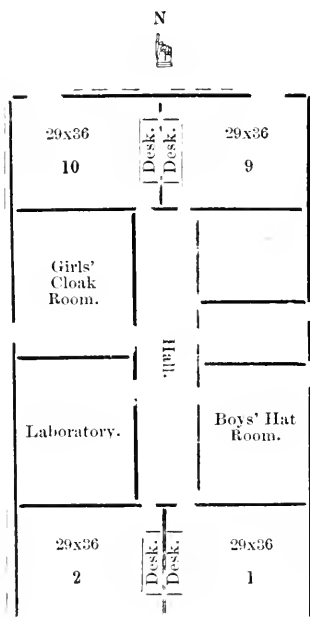


found closed, and the janitor informed me that they have not been open during his service at this building.

The movement of air through the fresh air registers was as follows: on the first floor, in room 1, it was 75 feet per minute; in room 2, 85 feet; in room 9, 130 feet; in room 10, it was also 130 feet per minute.

On the second floor in room 1 it was 55 feet; room 2, no movement; room 3, no movement; room 4, 90 feet

For the removal of the foul air, certain old chimney flues, which were built in the outer walls for the purpose of conveying warm air to the rooms, when the building was heated with hot air furnaces, have been utilized. These extend from the basement, where they are now closed, to and above the roof, and each has registers set in



HIGH SCHOOL, PORTLAND. (1st Floor, with wings omitted.)

it for the ventilation of the rooms on the three different floors. These flues measure 28x10 inches in their internal diameters. The high-school rooms have registers 28x20 inches set in them, one for each room on the lower floor, and two for each of the four large rooms of the second floor. These registers, are all of an objectionable kind,

in that the castings which constitute the fret-work are of a massive kind and fill more than half the space occupied by the register, thus obstructing very much the movement of the air through the openings.

The movement of the air through the foul-air registers was taken at two different times, January 13 and February 27. On the first date, the following results were obtained :

*First floor*—Room 1, 100 feet per minute.

Room 2, a downward movement of fresh cold air at the rate of 160 feet per minute. It being learned that the steam was not on in the coil in this flue it was ordered to be put on, and half an hour later, there was an upward movement of 130 feet.

Room 9, 90 feet.

Room 10, 105 feet.

*Second floor*—Room 1, south register, 100 feet ; north register, no movement.

Room 2, south register, 110 feet downward movement ; north register, 80 feet.

Room 3, south register, no movement ; north register, 80 feet.

Room 4, south register, 155 feet ; north register, no movement.

At the date of the last observations, arrangements had been made with the janitor to the effect that the steam was not to be turned into the coils in the foul-air flues in the morning, until the rate of movement through the registers had been taken, and, then turning on the steam, in about an hour, or after the flues had become warmed, the velocity of the air in them was again to be observed. There was a failure, however, to turn the steam on into some of the flues until fifteen or twenty minutes before beginning to make the second set of observations.

*First Floor*—Room 1, temperature 69°, flue not heated, 80 feet ; after heating, the same.

Room 2, temperature 67°, not heated, 130 ; heated, 110.

Room 9, temperature 70°, not heated, 82 ; heated, 130.

Room 10, temperature 70°, not heated, 65 ; heated, 125.

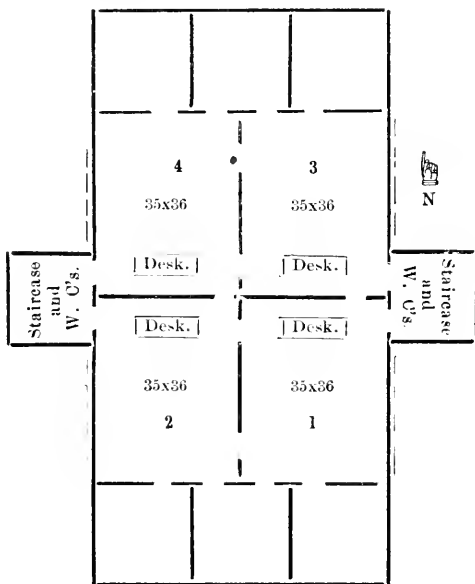
*Second floor*—Room 1, temperature 59°, south register, not heated, no movement ; heated, the same ; north register, not heated, no movement ; heated, 80 feet.

Room 2, temperature 70°, south register not heated, 70 ; heated, no movement ; north register, not heated, 58 ; heated, 60.

Room 3, south register, not heated, no movement ; heated, the same ; north register, not heated, no movement ; heated, 60.

Room 4, temperature 67°, south register, not heated, no movement; heated, 110; north register, not heated, no movement; heated, no outward movement, but an inward movement of cold air coming apparently from a horizontal ventilation duct from one of the recitation rooms which enters the flue just behind the register.

These observations were made with the doors and windows closed. The temperature of the external atmosphere was from 35° to 40°. A glance at the results shows that the removal of foul air from the rooms by means of these flues is not an active and trustworthy one. Better average results than in any other were obtained at the register in Room 9. The average of the three measurements would be a



High School, Portland. (Second Floor.)

velocity of 100 feet per minute, and calling the opening 28x10 inches, this would effect the removal of about 215 cubic feet of foul air per hour for each scholar, and this is an amount of ventilation which is worth something, though it is far from the ideal for which we should strive, and which is practicable. But while it is very doubtful whether an outflow of foul air approaching anywhere nearly what is represented by these figures exists at all times in any room, it is certain that other rooms, and especially those on the second

floor are unprovided with any trustworthy arrangements for removing the foul air.

There are several reasons why we could not expect the present system of ventilation to be anything but a failure. In the first place the fresh-air inlets are much too small, they are insufficiently heated, and they have too many sharp angles in their course. As regards the foul-air removal, the numerous brick flues which are now used for that purpose, were not designed for it, but were left rough on the inside, as most such flues are, and this want of smoothness offers a considerable resistance to the upward movement of the air current. On account of their number and small size, the inner surface of the brickwork which comes in contact with the moving column, is much greater than it would be if the collective capacity of the various flues were gathered into one large central flue, and, consequently, the friction which retards the movement of air is greatly in excess of what it would be in a large central shaft. Each of the present flues is 28x10 inches, inside measurement, and this is about the size of the opening in each register, after deducting the part which is filled by the fret-work. One of these is set into the flue on each floor, and consequently the carrying capacity of each flue is far below that of the registers for delivering air. Each flue, with its column of air at times insufficiently heated, and at all times retarded by excessive friction, can do only a limited amount of work; and, performing this for a room on one floor, it cannot work for the rooms on the other floors. The ventilating capacity of the present flues would, also, in a minor degree be increased if they were placed centrally within the building, instead of upon the outer walls. A steam coil is placed within each flue, excepting one, on a level with the lowest register which enters it. In the exceptional case, the location of the coil had been changed to the upper part of the flue with the hope of thereby increasing its drawing power. This flue is the one which is tapped by the register in Room 1, first floor, and by the south register in Room 1, second floor.

The air was tested for carbonic acid in only Rooms 9 and 10 on the first floor, and there were found eighteen parts of it in ten thousand of air.

The plumbing of the building generally appears to be in a satisfactory condition. The water-closets, situated in the wing on each side of the building, are of the trough variety, or, as they are usually called, privy sinks. This style of fixture, when looked after care-

fully by the janitor. as closets of all kinds in school buildings need to be, works very satisfactorily.

*Cumberland Street Grammar.*

This is on the third floor of the high school building. It is entered by a continuation of the winding staircase which leads to the second floor of the high school. Extending across the short diameter of this floor, from staircase to staircase, there is a central portion, which is occupied by halls and cloak rooms. The remaining part of the floor in either end, is divided into four school-rooms and two small rooms used for recitation or other purposes. The entrance to and exit from the smaller rooms and the two large school-rooms at the extreme end of the floor, are through the two rooms next to the cloak rooms. The lighting of three of the rooms, out of the four in each end of the building, is extremely bad. In the two next to the cloak rooms, there are only two windows at one side, which are expected to throw their light across a width of room of 39 feet in one room, and about 35 feet in the other. In a third room there are four windows at one end, and the distance to the opposite wall is about 33 feet. Three hundred and sixty pupils, or an average of forty-five for each of the eight rooms, attend here.

The plan of this floor is most pernicious in every respect; extremely bad lighting for six out of eight of the rooms, overcrowding, and deficient ventilation.

*The Butler School.*

This school building, situated at the corner of Pine and West streets, was ingeniously planned by the architect to conform in shape to the acute angle made by the junction of these two streets. The general shape of the ground plan is like that of a heavy-faced letter V, with the angle considerably truncated and directed toward the corner made by the streets. In the lower part of the V, on each floor, are two school-rooms, and, in each arm, two others. The latter are separated from the rooms in the apex by a spacious hall, and a hall extends along the inside of the rooms in the wings. The plan is the same on both floors; consequently, there are twelve study rooms in the building. Each room is provided with a clothes-room and a teacher's cloak closet.

The height of the walls in all the rooms is 14 feet. In the angle of the building the rooms are 23 x 33, and in the wings 30 x 24.

The rooms in the angle are lighted by three windows at the left, which are expected to throw their light across the longer diameter of the room, thirty-three feet; but, as the tops of the windows are only twelve feet from the floor, this is a much greater distance than can be lighted by the unilateral plan. In addition to the windows mentioned, there is, in the room on the Pine street side, a window at the left and in front of the scholars, which, if needed on the outside for architectural effect, should be kept closed on the inside to spare the eyes of the pupils; and, in the room on the West street side, a window at the left and back of the scholars helps considerably in supplying light from a favorable direction. One of the rooms in each wing is lighted from the side and rear, and the other from the left side only, the shape of the room making one-sided lighting practicable.

The school-rooms are all heated by indirect steam radiation. The method of ventilating this building appears to be excellent, and the workmanship of the apparatus is good. Each fresh-air duct is carried, separate and distinct from all others, from its intake through the basement wall to its discharge within the room for which it is destined. Each galvanized iron fresh-air pipe, fourteen inches in diameter, conducts the air to the coil boxes, whence it passes to its room above. Each room has two of these fresh-air inlets.

#### *Carroll Street Primary.*

In the building of this new school-house, the city spared no expense. It was finished in 1887. There are four rooms, 25x30x13 in size, on each floor. Each room has six windows, three of which are on one side, and the other three at the back; and, as each window has twelve panes, 24x14 inches in size, each room has an abundance of light.

The building is heated by indirect radiation from steam coils in boxes in the basement. Each room has two warm air registers, 18x11 inches in size. In each corner of the basement there are two fresh-air inlets, and corresponding boxes for the steam coils. One of these fresh-air ducts is single, and communicates with the room on the first floor above it; the other is compound, supplying one register on the first floor and the two on the second floor. This arrangement of compound ducts, either for the fresh air or the foul air, needs to be planned with skill and afterwards managed with care, or good results will not be obtained.

For removing the foul air, each room is provided with two registers, one near the ceiling and one near the floor. These discharge into galvanized-iron flues, which, for each room, run separate to the upper part of the attic, where they enter one of the three large ventilators, which pass through the roof. Just before entering these ventilators, each pipe makes a bend which is more than that of a right angle. This must necessarily check the movement of the air within the pipes to a considerable extent.

The quality of the work which was done in putting in the ventilating system in this building and the Butler school is generally very excellent. It was a pleasure to see the closely-riveted, galvanized-iron, air-ducts and steam-coil boxes, instead of the leaky wooden ones, which are too frequently found where better work might be afforded.

The average velocity of air movement through four of the registers which were tested was 225 feet a minute. At this rate, with the upper register closed, as it ought to be in cold weather, and as it was undoubtedly designed to be, each scholar in these rooms with the average daily attendance would have ten or twelve cubic feet of vitiated air removed for him each minute, to be replaced with a like quantity of fresh air, assuming that one-third of the surface of the register is covered by the fret-work. This, even for primary pupils, is not a supply with which we should be content.

All the rooms in this building are supplied with beautiful slate blackboards. Blackboards of this material are somewhat costly, but they are lasting and satisfactory.

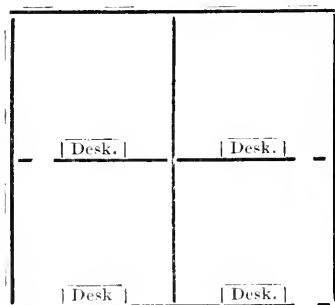
The privy sinks in the basement appear to be kept in good condition, and the same may be said of the slate urinals, which are odorless.

#### *North School.*

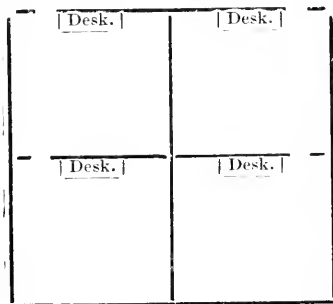
This is a brick building, three stories high, and containing eight rooms on each floor, or twenty-four rooms altogether. The entrance to the building is in the central part of each long side, and, from door to door, across the shorter diameter of the building, as has been described in the Cumberland grammar school, there is a central space occupied by staircase, hall and cloak room. The space remaining at each end of the floor is divided into four rooms of equal size, all measuring 23x27 feet. To reach the rooms in the extreme end, one has to pass through the rooms which are next to the hall. The four rooms at the end of each floor are separated from each other by

glass partitions which can be raised, throwing the four rooms into one.

The lighting of the two rooms at the extreme end of the floor is by two windows in each of its two outer walls, and, in the two rooms next to the hall, it is by means of only two windows at one side of each. In the latter rooms, the lighting is very deficient in amount, even with the help of the little light which these rooms steal from the two rooms in the outer end. The desks in all the rooms are placed on that side which is toward the central hall, consequently the lateral lighting is from the scholars' left in half of the rooms, and from their right in the others.



Halls and Clothes Rooms.



NORTH SCHOOL, PORTLAND.

The whole building is heated with steam, the direct radiation system being used. No provisions whatever are made for the supplying of fresh air. For the removal of foul air, a system of registers,



ducts and flues is present, which is complicated and curious, and makes this one of the most interesting things in the architecture of the building; but the whole arrangement is as useless as it is interesting. Each room has two small foul-air registers, opening into cold brick flues in the walls of the building. All of the flues in the eight rooms on the first floor, and those in four of the rooms on the second floor were tested with the air meter, but no movement of air whatever was found in any of them. This led to the suspicion that the flues were blind ducts, that is, put in for ornamental purposes, and closed at the upper ends. A visit to the attic showed that the upper ends of the flues were open, and that, extending from its top, each had a wooden board duct leading, with several sharp turns, to a brick flue near the center of the attic. There are four of these central flues, to which the large number of small wooden flues from the various rooms converge. At the junction of the brick flue with the lower end of the wooden duct, there is, in most cases, a deficiency of one brick or more, and the union of the upper end of the wooden flue with the central flues is also loose and leaky. The whole arrangement is worthless, and its construction was a waste of money for the city, and a disgrace to the architect or builder who contrived it.

We have, therefore, in this building an entire absence of ventilation, excepting what may be secured through the windows, with the accompanying danger of draughts upon the heads of the children in these crowded rooms. In some of these rooms the smell of the organic matter of expired air is very strong and disagreeable. Two of the rooms only were tested for carbonic acid in their atmosphere and the quantity found was respectively, twenty-two and twenty parts in the ten thousand. The whole plan of the building deserves condemnation.

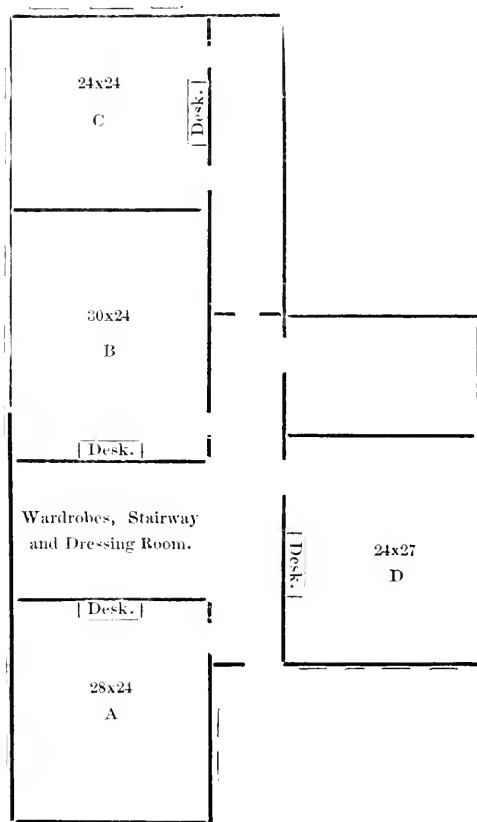
In the basement, another architectural curiosity was found which now has no sanitary significance, as it has gone out of use. It is interesting merely as showing what senseless ideas sometimes prevail, when an impulse seizes somebody to supply a large school with fresh air. It consists in three wooden ducts starting from basement windows, each giving off two branch ducts, 7 inches in diameter, probably intended to supply air to the twelve rooms in the south end of the building.

Instead of water-closets, there are privies, which are placed in a shed back of the school building, and only five feet from it. The

vaults beneath the shed are with difficulty accessible, and are emptied only once a year. The boys' urinals are in an adjoining shed. The whole system of disposing of excreta is utterly abominable, and should be immediately abolished.

*Casco Street Primary.*

This school-house has eight rooms, four on each of the two floors. A reference to the plan of the building will show that a long central hall runs though the building, on the left of which are three rooms, and on the right is one. The lighting in rooms B and D is very



CASCO STREET PRIMARY SCHOOL, PORTLAND.

insufficient. In room B, the ratio of window glass surface to the floor surface is less than one to thirteen, and in room D, it is less than one to eight. In both of these rooms it will be seen that the

lighting is unilateral,—in room B, from the right, and in room D, from the left. Between rooms B and C there is a glass partition, the principal object of which, probably, was to help overcome the deficiency of light in room B. Room C, however, has no light to spare. Room B could be favorably lighted by putting in an opaque partition between it and room C, turning around the scholars' desks, and putting two additional windows into the outside wall. These windows should run clear to the ceiling whether their tops were level with those of the other windows or not. Room D is rather too long to successfully light from one end.

The building is heated by direct steam radiation. Foul air ventilation is sought by means of openings into flues, which are not heated.

#### *Chestnut Street Primary.*

On each of the three floors of this building, the halls form a cross, and each corner is occupied by a room, each of which is 24x23x nearly 12 feet in size. The lighting is from the rear and one side, and the lateral lighting presents the usual fault that one-half of the rooms have it from the right, instead of from the left side. The system of ventilation is not what it should be, but is better than none. The air of one of the rooms on the first floor showed 16 parts, and one on the second floor 18 parts of carbonic acid in the ten thousand.

#### *Shailer Primary School.*

This is a three-story building, with four rooms each on the first and second floors, and one finished on the third. The rooms are all 26 feet square. The windows are good and large, and are placed so as to supply light from one side and the rear. The only objection to the lighting is that in one-half of the rooms, the lateral light comes from the right hand, instead of the left. On the sunny side of the house, the light is probably too dazzling at times; but, by closing the inside shutters when it is necessary, this difficulty may be avoided. The most serious fault as regards the effect upon the eyesight of the children, is the location of some of the blackboards between the windows. This building presents a good example of the modern tendency to multiply blackboards unnecessarily. The blackboards on the two walls opposite the windows are very favorably situated and beautifully lighted; but the short blackboards between the windows, if used, are a constant source of danger to the eyesight

of those who have to look towards them. The heating is wholly by direct radiation from steam pipes, which are arranged around the walls of the rooms. The fault in the original plan in not providing for the admission of fresh air has apparently been felt, and an attempt has been made to supply the deficiency by means of moveable, wooden hoods, or fresh-air inlets, which, when a window is raised, take the air from the opening thus made, and deflect it downward upon the steam pipes. The length of the section of pipe, however, with which the air comes in contact, is not great enough to warm the air sufficiently; consequently, the inflow of cold air is uncomfortable for the feet of the children, and this device for admitting fresh air is but little used.

The disposal of foul air, with a little modification of the original plan, and an insignificant increase in the cost of the building, might have been very satisfactory. The rooms on each floor are ranged on both sides of the hall in pairs, and between the two rooms of each pair a chimney stack runs from the floor of the basement to the roof. Into the flues thus formed, the foul-air registers of the rooms on either side of it are set. The amount of work which they do is inadequate to the wants of the school for the reason, first, that the foul-air flues are of insufficient capacity, and secondly, that they are insufficiently heated. One of the flues is heated by the smoke pipe from the boiler, the other is not heated. If the flues had been made of ample size and provision had been made for heating by placing steam coils within them, or, at least, in the one which is not heated with the smoke pipe, an efficient and trustworthy system of ventilation might have been secured.

#### RICHMOND.

##### *High School Building.*

This accommodates the high school on the first floor, and the grammar school on the second. It is an old wooden structure. The lighting is from both sides and the rear, and the light in the second story appears to be a little deficient in quantity. The windows are the only dependence for ventilation. The heating is by means of wood stoves. The privies, placed at the back of the building at some distance, are provided with a covered walk leading to them.

##### *New Intermediate and Primary School.*

This building was finished in 1885, and is a credit to the town. It is of brick, 50x42 feet in size, with a projecting front portion,

22x12 feet. Each of the two floors has two school-rooms, and each school-room is provided with a clothes-room. The rooms are all alike in size and shape, being 38x20 feet. Rooms whose length considerably exceeds their breadth and with the teachers' desk at the middle of one of the shorter sides are preferable to rooms of a square shape; but the rooms in this building are rather too long in proportion to their width, being nearly as two to one. The heating is by direct steam radiation. There are no special provisions for ventilation, and this seems more the pity, since the position of the chimney stack is very convenient for placing at least one foul-air register in each room, and the flues could easily have been properly arranged and made of sufficient size. The lighting in two of the rooms is from the left and rear; the lighting of the two rooms on the other side of the building is from the right and the rear.

A sacrifice of architectural symmetry on the back of the building, by omitting the end windows in these two rooms and transposing the position of the desk, would have secured left-sided illumination, which, where possible, is always to be preferred. In rooms of this, or considerably greater width, there would be no difficulty in making unilateral lighting successful. The windows are provided with inside shutters.

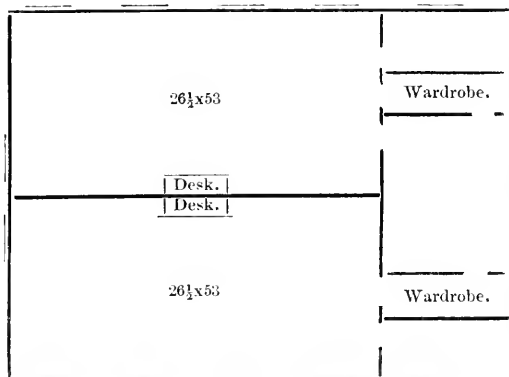
In this building, the blackboards are found in a much better position than is usual in our school-houses. They are placed along the central wall, and are very favorably lighted by the opposite windows. The privies are placed 20 feet behind the building. They are in separate buildings, and have separate approaches.

#### ROCKLAND.

##### *High School.*

The building is of brick, three stories high, including the floor in the roof, and was erected in 1868. The house is very badly planned. The first floor, aside from the space which is occupied by the hall, clothes rooms and poorly arranged recitation rooms, is evenly divided into two school rooms. Each is 26x53 feet, the teacher's desk being placed against the long inside wall, an arrangement as good, perhaps, as any which could be made in a room of so awkward a shape, but manifestly a position which does not permit the teacher easily to keep the school under his eye. Each room has four windows at the back of the scholars, and, in addition, the north room has one on

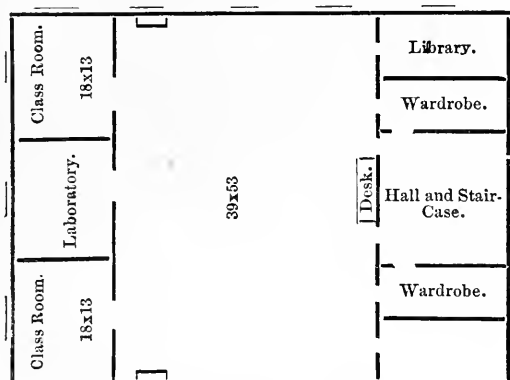
the right towards the front, and the south room one at the left near the front corner. These windows light the room very imperfectly, the proportion of glass surface to floor surface in each of them being less than 1 to 12. The whole building is heated by steam, the direct system of radiation being in use. There are, therefore, no provisions for bringing in fresh air, and those for extracting the foul air are altogether inadequate.



HIGH SCHOOL BUILDING, ROCKLAND. (1st Floor, Intermediate Grade.)

The high school room on the second floor is large, being  $39 \times 53$  feet in size. In front, there is the same arrangement of hall, staircase, wardrobe and recitation rooms, one of which is used as a library, as on the first floor. At the rear of the school-room are the laboratory and two class rooms. The lighting comes from three windows on each side, and the combined surface of the windows is only a little more than one-sixteenth of the floor surface. The lighting is even worse than in the two rooms on the first floor. Two small foul-air registers are inserted into the flues near the ceiling, which can give only very imperfect ventilation. Probably of much more worth to the school for ventilating purposes are the window boards, which are in use in all the rooms in the building. These are four or five inches wide, and as long as the width of the window. When the bottom sash is raised and the window board is placed beneath it, a small space is left between the upper and lower sashes through which air may enter in an upward direction, so as to avoid striking the heads of the children. In houses built like this, with no arrangements for ventilation which can command the respect of the

teachers, this system of ventilation by means of window-boards is deserving of commendation and of more general use. The daily average attendance in this room is over 100, and even with the constant use of the window-board ventilation, the air must be very bad at times. The desks in this room are of an approved shape. The



HIGH SCHOOL, ROCKLAND. (2d Floor.)

back has the single curve, instead of the double or S curve, which is too often found in modern desks. The faulty shape causes a tendency to slip downward and forward, while the single curve gives support to the lower part of the spine, where it is needed. The desk in use is the New Fearless, manufactured by C. W. Clark of Boston.

#### *Lincoln Street Grammar School.*

The third floor is occupied by the Lincoln street grammar school. The plan of this school-room is the same as that of the room on the second floor. There is the same number of windows as in the high school room, but they are set two feet deep, and their casing shuts off much of the light. The illumination is exceedingly bad, much worse even than that on the second floor; and an attempt, but not a very successful one, to increase the quantity of light has been made by putting in a glass partition between the rear of the room and the class rooms, so as to utilize the light from the class room windows. The ventilation is also very bad. The average daily attendance in this room is 118.

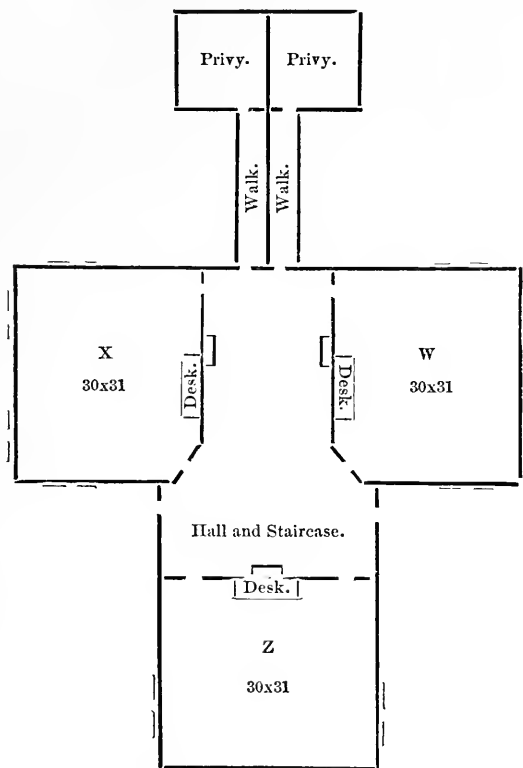
The main staircase to the second and third floors is six feet wide, and the side flights above the landing, are three feet and a half. Much more ample opportunity for escape in case of fire is imperatively demanded. The upper stories have no fire escapes, and no fire drill is practised. The privies are situated 35 or 40 feet back of the building. They are said to be cleaned out once a year, but their odor was not reassuring. There was formerly a vault in the cellar, but on account of a limited supply of water it was removed.

*Purchase Street School-House.*

This building presents a somewhat unique architectural appearance, but the plan has some advantages, which commend it. It consists of a central hall of ample size, containing the staircase leading to the second floor. The three rooms on each floor form three wings, which, taken together with the central hall, make an Egyptian cross. The plan is the same on the two floors. Each school-room is 30x31 feet. The teacher's desk is placed on the hall side of the room, and the lighting is from the other three sides, that is, two mullion windows in the rear and one on each side, the latter set pretty well back. The room appeared to be well lighted, though a little greater height of window sill would have made it still better. The heating is accomplished by three furnaces in the basement, one for each wing, and each furnace was intended to heat a room on the first floor and one on the second. The arrangement of the warm air pipes, however, gives the upper rooms a great advantage over the lower; and, at times, instead of sharing the heat fairly, the upper rooms extract warm air from the lower, and, consequently, it has been found necessary to put stoves into the lower rooms in the north and west wings. The warm-air pipes were arranged with some ingenuity, but not much judgment. From the top of the furnace a twenty-two inch pipe goes to the register on the first floor and hanging inside of this larger pipe with its open mouth about on a level with the first floor, is a smaller pipe, 12 inches in diameter, which runs to the register on the second floor. Each room has one foul-air register, 10x14 inches, set into the flue, which is heated by the smoke pipe of its corresponding furnace. In the lower rooms, the register is placed close by the side of and about its size above the warm-air register, in an admirable position to catch a part, at least, of the faint current of warm air, as it comes from the furnace. In the upper rooms, the foul-air register is near the ceiling. There are also foul-air registers in the



wall, unconnected with heated flues, and therefore, they cannot be expected to be of much service. Three registers are in the hall floor for the purpose of letting the warm air from the cellar into the hall, and, in the absence of fresh-air boxes for the furnaces, the proposition had been entertained of supplying the furnaces with fresh air



PURCHASE STREET PRIMARY SCHOOL, (1st Floor) ROCKLAND.

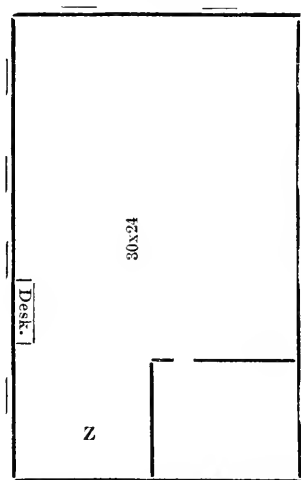
by means of ducts, running from these hall registers to the furnaces! Fresh (?) air would then be taken from the first floor and carried down to be warmed for the school-rooms. Each room is supplied with a sink and tap, and with water from the city supply. The privy is a two-story structure at the rear of the school-house, twenty-five feet distant with covered walks running from the rear hall.

#### *Grace Street Primary School.*

This is an old, two-story, wooden building with a room on each floor, 30x24 feet, and in addition to this, on the second floor the par-

tition wall has been removed between the main school-room and the part "Z," which formerly was a small recitation room, thus bringing the two windows of that end directly before the eyes of the scholars. There is, therefore, no suitable place left for the teacher's desk or for the placing of blackboards. I was told that there are four or five other wooden, two-story school-houses, built on almost exactly the same plan as was this, and in some of them also this partition wall has been removed, thus making the lighting of the house more objectionable than it otherwise would be.

In the Grace St. primary it will be noticed that there are windows on both sides, at the rear, and in front of the scholars, and that the teacher's desk is between two of the lateral windows, making altogether a very bad arrangement. The heating is by means of coal stoves, and the sole means of ventilation are the windows.



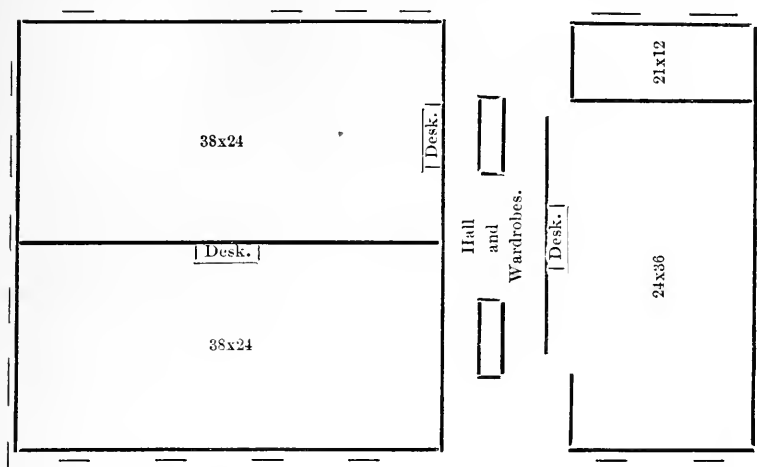
GRACE STREET PRIMARY SCHOOL, (2d Floor) ROCKLAND.

#### SACCARAPPA.

##### *High School.*

The new high school building presents a pleasing architectural effect, but, though it cost \$20,000, it is badly arranged and is giving much dissatisfaction, especially on account of the entire lack of provision for ventilation. There are neither any means for admitting fresh air, nor for removing foul air, and, at the request of the school committee of Westbrook, the house was visited to see whether any

suggestions could be made for remedying the want of ventilation. A reference to the diagrams, which represent the plan of the first and a part of the second floor, will show that the first story contains

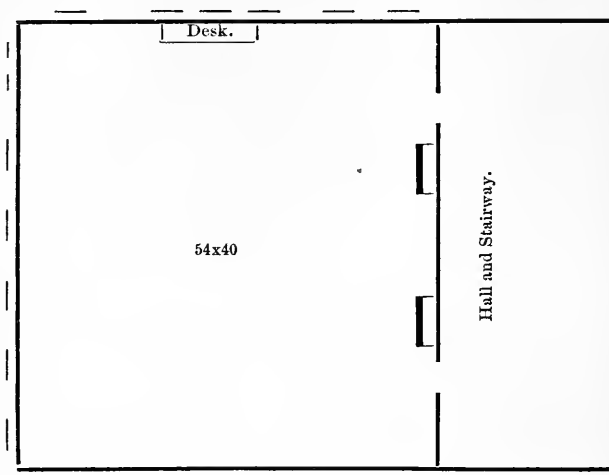


HIGH SCHOOL, (1st Floor) SACCARAPPA.

two rooms on the south side of the hall, and one school-room and a recitation room on the north side. The lighting of the rooms on the first floor though not entirely satisfactory is much better than the arrangements for lighting the room on the second floor. The windows are all furnished with inside shutters. The whole building is warmed by steam pipes placed around the wall; but there are no arrangements whatever for ventilation, not even double windows, which might be used to remedy the defect in some measure.

The high school, on the second floor, has a large room about 54x40 feet in size, lighted from the rear, from the left hand and from in front of the pupils. There are three windows grouped exactly behind the teacher's desk. The present arrangement of the seats, which I believe is according to the original design, is found so injurious, as regards the eyesight of the scholars, that the school committee are considering the matter of transposing the position of the teacher and the scholars so that the latter may face the windowless wall. This will be a great improvement; but it is doubtful whether, even then, the lighting will be entirely satisfactory. The water-closets are in

the basement, and are of the long-hopper variety, which is unsuitable for school purposes.



HIGH SCHOOL, (2d Floor) SACCARAPPA.

The following report, which was sent to the school committee, embodies the recommendations which were made in regard to the ventilation of the building :

"In your presence I made a brief inspection of your high school building, with a view to devising a plan for improving its sanitary condition, particularly its ventilation; and I herewith put the recommendations, which I saw fit to make, into a shape which may be more intelligible to you than my hurried directions were. In cases where school-houses have been built, as yours was, without any regard to ventilation, work done subsequently, to remedy the defects in the original plan, is usually very costly, as compared with what it might have been, if done during the construction of the building; and many of these buildings cannot be satisfactorily ventilated, without very expensive tearing to pieces and re-constructing. As I pointed out to you, the two chimney-stacks, extending from the bottom of the basement up through the roof, and which were apparently built mostly for ornament, may be utilized for purposes of ventilation. Each of these two chimney stacks is divided through the center apparently by a single thickness of brick, making two flues twelve by (probably) twenty-three inches inside measurement. One of these flues in the chimney on the east side receives the smoke-pipe from the boiler; the other three flues are entirely unused. These two chimneys pass up through the high school-room against its northern wall. I would, therefore, recommend that a register, as large as the size of the flue will

admit and not less than a third larger than the area of a section of the flue, be set into the flue in the east stack, which does not receive the smoke-pipe, and one of similar size be set into one of the flues in the other stack. These registers should have as little as possible of their surface obstructed by the fretwork. They should be set close to the floor.

In each of the two school rooms in the first story, south of the hall, I would advise inserting a register into the floor, having it discharge into a well-made, galvanized-iron box just beneath the floor, from which a pipe of the same material shall extend to the chimney stacks, entering, on the west side, the flue which has not been entered by the register in the high school room, and, on the east side, entering the flue which receives the smoke-pipe, at a considerably lower level than the latter. This, of course, would diminish the draft of the boiler, and the amount of diminution which would be permissible could be determined only by trial. As it is now in so long a flue, a check draft has to be used pretty freely, and it might perhaps be found that the diminution of draft in the smoke pipe would be beneficial rather than injurious.

To insure a constant and sufficient draft, it would be necessary to place a steam coil in the flues which are not heated, opposite or just above the opening of the lower ventilation duct; the other chimney would probably be sufficiently heated by the smoke-pipe to insure a constant pull on the foul-air column.

For the north room on the first floor I can think of no inexpensive way for securing an outlet for the foul air.

For supplying fresh air, the best method would be to convert your direct steam radiation into indirect, by placing steam coils in large fresh-air boxes in the basement, and distributing the warmed air into the various rooms above, through pipes and registers. If, however, you do not wish at present to make changes which would be so costly, you can do very much towards supplying fresh air to the school by a constant and systematic use of window-boards, as I suggested verbally."

#### THOMASTON.

Many of the school buildings in Thomaston are old, but their condition shows careful and intelligent supervision. When examined the schools were not in session.

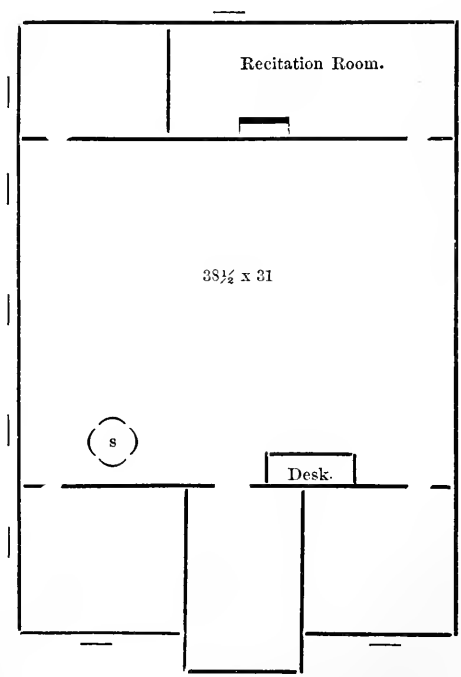
##### *High School.*

This building has stood since 1848, as an example of how school-houses were built in those days. It is a wooden building, 50x37 feet on the ground, two stories high, with a school-room, recitation room, girls' cloak-room and entry on each floor. The second floor is occupied by the high school; the first floor by the intermediate. The school-rooms are nearly 36 feet square, and are lighted with three windows on each side, and the same number at the rear of the

room. The lighting is not satisfactory, partly on account of an insufficient surface of glass used, and partly on account of the low position of the windows, the sills of which are only two feet from the floor. The windows are provided with inside shutters. The plan of the rooms gives no wall service suitable for the blackboards; they are placed all around the room in the short spaces between doors and windows. The heating is by means of a furnace in the basement, supplemented, in the case of the high school-room, by an open grate at the rear of the room. A foul-air register is placed at either end of the room at the ceiling, opening into the space between the walls and not connected with a heated flue. The privies are placed at the rear of the building.

*Grammar School, Green Street.*

This school-house, though built no longer ago than 1872, shows in its planning a complete ignorance of what is required in a building, to make it suitable for school purposes. The whole building on



GREEN ST. GRAMMAR SCHOOL (2ND FLOOR), THOMASTON.

the ground measures 52x40 feet. It has, on each floor, one large school-room, placed between the front recitation room and the halls, and the back recitation room and stairway. The school-rooms are each 31x38½ feet in size. They are lighted from the sides only, and the windows are required to throw their light across the longer diameter of the room. The lighting is extremely unsatisfactory. The proportion of window surface to floor surface is less than one-eleventh, and the central part of the building is not as well lighted as it would be, if the windows had been placed at a suitable height. The sills are only two feet from the floor. I was told that the deficiency of light in cloudy weather is found to be very trying to the eyes of the pupils. The recitation rooms are all poorly lighted.

The rooms are heated by means of two furnaces in the basement, each of which sends a warm-air pipe to each floor. On the second floor, supplemental heating comes from a coal stove. The provisions for ventilation, excepting when the windows can be used, are probably nearly valueless. Money spent in securing efficient ventilation would be well bestowed. The average daily attendance in one of the rooms is said to be eighty-five, and in the other, forty-three.

#### *Bailey Primary School.*

This building has two floors, with one school-room on each, 36x25 feet. Its lighting from the two sides and rear, though not of the best, is fairly good. Both rooms are heated by stoves, and ventilation is secured only through the windows. There are seats for 56 scholars, and the daily attendance averages 47. The privies are too near the side of the house. One of the windows of the second story has an outside fire-escape, a provision which is commendable, but is omitted from some other school-houses which need it even more than this.

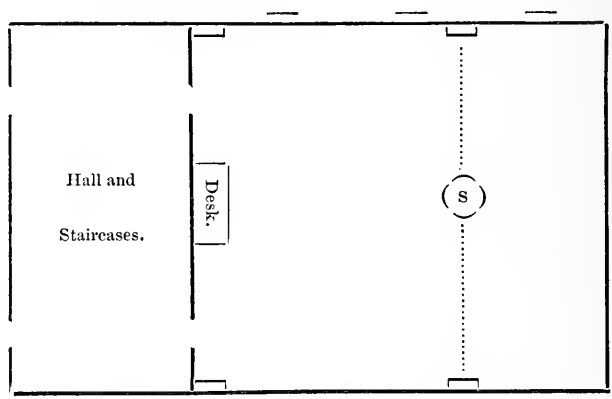
### WALDOBORO'.

#### *Brick School.*

This, a two-story building, has one school-room on each floor, and the primary school-room, which has recently been fitted up, in the basement. The rooms on the first and second floors are each 34x31 feet in size. They are lighted by three windows on each side and three in the rear, and the quantity of window surface, as compared with floor surface, is quite satisfactory. The heating is by means of a coal stove in each room, and the stove is set in the center of

the room with a pipe running to a chimney flue on either side of the room. There are no arrangements for the admission of fresh air without opening the windows. Two small foul-air registers are inserted into the flues near the ceiling. They are only 8 inches square.

The occupancy of the room in the basement, had given rise to quite a controversy concerning its fitness for school purposes which had been conducted with considerable feeling by the community. The room is situated in the lower, back part of the basement of the



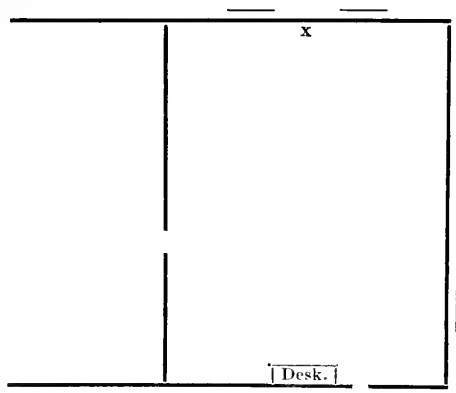
BRICK SCHOOL HOUSE, WALDOBORO'.

brick building, which, until the past season, had never been finished inside of the brick wall; and, as the ground rapidly falls off from the street, and, at the lower part, was somewhat damp, those who opposed the utilization of the basement as a school-room had good reasons for their objections. The building was constructed as is commonly the case, without any consideration of the facts that brick is very absorptive of water, and that damp walls are a constant menace to health; and, consequently, no damp-proof course was put into the walls to protect them from the dampness which would otherwise be transmitted to them from the foundation.

The size of this room is 31x25 feet, with a height of ceiling of ten feet. The room is fairly well lighted by two windows in the rear and three at the scholars' left side, and, in addition, another one, doing more harm than good, is placed nearly back of the teacher's desk. The heating of the room is accomplished by means of a wood stove. The plan for removing the foul air was devised



with reference also to the protection of the room from the dampness of the outer wall. The interior studding is set so that there is an air space between the outer and the inner walls all round the room, communicating through a register at (x), 12x14 inches in size, with one of the flues which is heated by the smoke pipes on the first and second floors; and, for the purpose of letting the foul air from the room into this space between the walls, four registers, one on each side of the room, each 6x14 inches in size, are set into the baseboard close to the floor. The movement of air, therefore, is through these registers into the space between the walls, and then upward through the larger register which communicates with the heated flue. A small wooden door in the inner wall near the ceiling, opposite inside register, permits an inspection of it.



PRIMARY ROOM IN BASEMENT OF BRICK BUILDING, WALDOBORO'.

x. Large register in flue.

This plan for shielding the school-room from the influence of wall dampness was proposed by the local board of health, and carried out under their direction. In cold weather, when artificial heating is employed, it will be likely to accomplish its end very well; but, in summer, when there will be but little, if any, draught through the registers, this protection against wall dampness will not exist.

Beneath the floor of the room, there is a space or sub-basement about three feet in height, which is ventilated by large open windows in the wall. This arrangement will be likely to ventilate this space; but, without further protection, the floor will be very cold in winter.

The question of the expediency of using the room for school purposes, now it is finished, was referred to me and the advice given was to use it at present, and until a more suitable building can be erected.

#### *East Primary School.*

This is a little, mean, old-fashioned, one-story, wooden school-house, which still remains as an example of the worst forms of the school-house architecture, which prevailed years ago. The single room is  $19\frac{1}{2} \times 15\frac{1}{2}$  feet on the floor, and the ceiling is only eight and three quarters feet high. The room has two small windows on each side; but, as the scholars' desks are so arranged on each side that all face the center of the room and the two windows on the opposite wall, the lighting is from the back and the front. The room is heated by a stove, and there is no ventilation, excepting the accidental kind which sends currents of cold air beneath the door and along the floor, or brings in through the cracks around the windows cold draughts upon the heads and shoulders of the children. The only thing to commend about the house is the dry ledge on which it stands, which would make a healthy but bleak site for a better school-house.

#### *Primary.*

This is another very old, wooden house, built on the same plan as the one last described, with the same height of ceiling, the same arrangement of windows, the same bad method of seating as regards the relation of scholars to the light, and the same accompanying difficulty of keeping the children comfortable in cold weather. The same single commendation may be bestowed upon it, in that it, also, stands upon a dry ledge.

### YARMOUTH.

#### *High School.*

This is an old, brick building, two stories high. The high school-room is on the first floor. On the second floor, the same space is divided lengthwise, forming two long, narrow recitation rooms. The school-room,  $33 \times 27$  feet is lighted by three, large, old-fashioned windows on each side and one at the rear, and is warmed by two stoves, not jacketed. Window boards are in use, but, otherwise, there are no arrangements for ventilation. The privies are built against the house on the north end, and are dilapidated and unclean.

*District No. 3, Primary and Grammar Schools.*

The single school-room in this building is 30x28 feet, lighted by the same arrangement of windows as in the high school-room, but the windows are placed much too low to get the best effect from the light which is admitted. The heating is by means of a stove. In the building of the house, there appears to have been a recognition of the need of some method of ventilation; but the means employed to secure it though devised with some ingenuity, must necessarily be a failure, since there is neither a heated flue nor mechanical power used in connection with it to make the air move. The fresh air duct consists of a line of six-inch stove pipe running underneath the floor, crosswise of the room, and at each end communicating with an opening in the underpinning. Placing the eye at one end of this stove pipe one can look straight through and see the daylight at the opposite end. This communicates, in the middle, with a small register set in the floor; and, if there were any means for forcing the air steadily through this fixture, it might furnish sufficient air for the use of two or three persons, but could hardly be expected to supply the needs of the thirty-five or forty pupils, who attend the school. For escape of foul air, a register in the ceiling communicates with a shaft running up into a little tower on the roof of the building; but, as this is not artificially heated, it can be considered only a very faulty apparatus. The privy is built against the rear end of the building, and is entered through a door opening from the school-room. An attempt to isolate it from the school-room is made; but the space which is left does not permit the free circulation of air, and the whole arrangement, therefore, is dangerous.

*School District No. 9.*

This is a neat-looking, modern school-house, built very much upon the plan of the school building in district No. 3, and, like it, has the window sills only two and half feet from the floor. The room is heated by a stove, and fresh air in abundance for an average attendance of forty-five pupils is wrongfully supposed to enter through an opening only six by four inches in size. The foul-air registers are inserted into the wall on each side of the room near the floor and would discharge into the space between the walls and into the attic, if there were any motive power to drive the air out and upward.

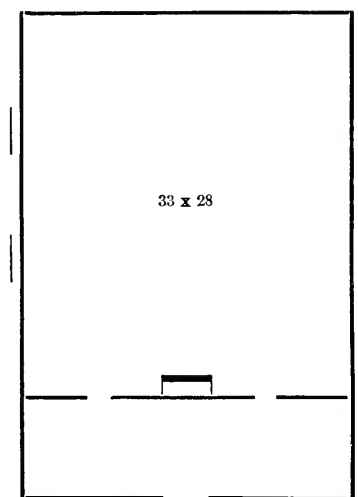
*District No. 9, Primary School.*

This is an old brick building, the one school-room in it being 30x26 feet, with the floor so laid that it is eighteen inches higher at

the back part of the room than in front. This arrangement cuts down the insufficient height of the ceiling from ten feet at the teacher's desk to eight and a half feet at the back of the room. There are three windows on each side and three at the rear, and the elevation of the scholars in the rear seats shuts off much of the light, which would otherwise come to the front rows of desks from the rear windows. The room is warmed with stoves. A small register in the ceiling and a six-inch stove-pipe, running from it through the roof, offers a chance for a little of the foul air and some of the hot air from the stove to escape. There are no provisions for supplying fresh air to the fifty-seven scholars who attend on an average.

*Grammar School, same district.*

This stands side by side with the preceding building, is constructed of the same material, and presents nearly the same old fashioned appearance externally. Within, it is warmed in the same way, and the same crude attempt at ventilation is made, with a piece of stove-



DIST. NO. 9, GRAMMAR SCHOOL, YARMOUTH.

pipe running from ceiling to roof. The light is still worse than in the other building, for there are only two windows on each side, and the combined surface of them all is only about one-fifteenth of the floor surface. The privies for these two buildings are placed

midway between, and slightly in the rear of them, but only twenty-five feet from each school-room. They are filthy, and apparently rarely looked after.

## INSPECTION OF STATE INSANE HOSPITAL.

The committee of the Board which was sent to make an examination of the sanitary condition of the State Insane Hospital begs leave to report as follows :

Our first visit was made on March 29th, and a second visit May 16th, on which last day we were able to examine and realize more thoroughly the conditions outside of the building, i. e., the disposal of the sewage. Several other visits were made by some of the members of the committee during the colder months of the latter part of the year for the purpose of examining the efficiency of the arrangements for ventilation.

It will be seen by referring to the sketch plan which accompanies this report, that the Hospital consists, at the present time, of a central building from which three wings extend on each side, and two pavilions in the rear, and to either side. The central building and the first wings represent the Hospital as it was built in 1840, while the second and third wings have been successively added in later years as the needs of the institution have required them. The two pavilions were completed in 1880 and 1883. All of the buildings are of granite except the pavilions; the latter are of brick. All those buildings which are occupied by the patients, wings and pavilions, are three stories high. The south wings and pavilion are occupied by male patients while the corresponding buildings on the north side are for the use of female patients.

### *Ventilation.*

The older wings of this institution were built without any adequate system of ventilation, therefore, the problem of how to provide for the introduction of fresh air and the removal of foul air in sufficient quantity to insure the physical health of its inmates has been a difficult one as it always is in similar buildings where so serious a fault of omission has existed in the original plan of the architect. The very small registers and flues which were one of the characteristics of the old buildings, have necessitated extensive and costly tearing out of old flues and the putting in of others of a more appropriate

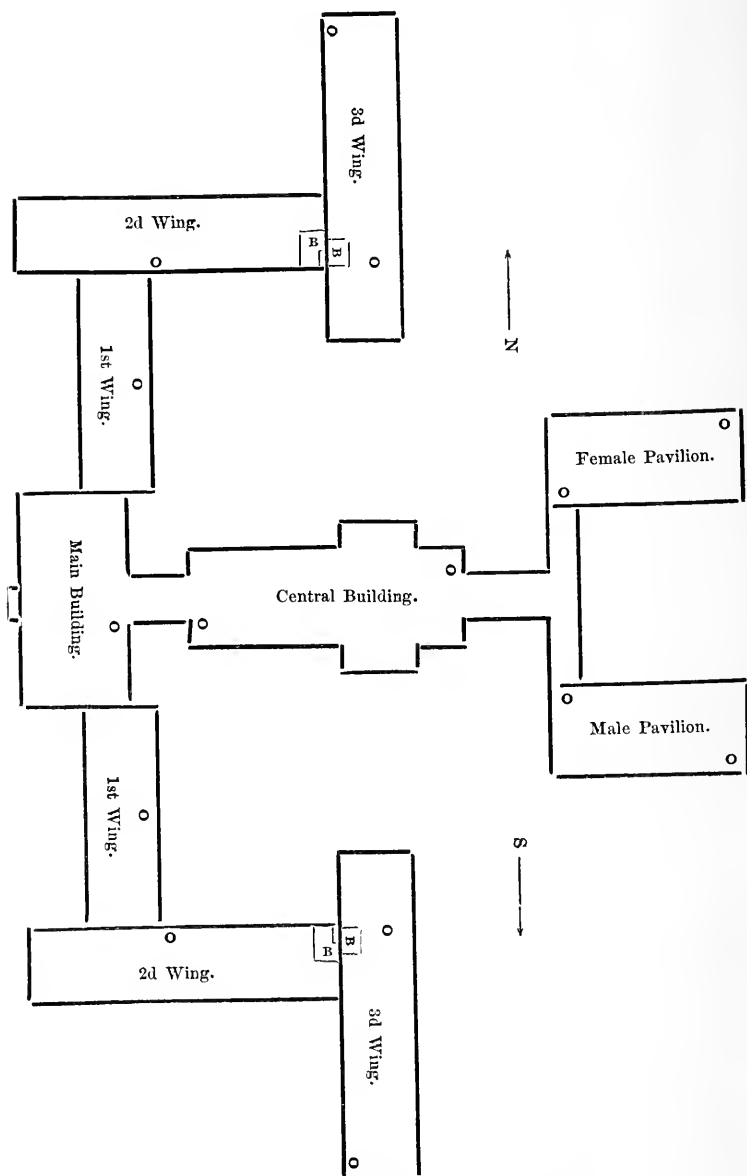


Diagram showing arrangement of buildings of State Insane Hospital. o, o, o, Stand Pipes;  
B, B, B, B, Bath Rooms between 2d and 3d Wings.

kind, where they have been found to be needed. Under the present management, this work of improvement has been done quite rapidly, taking into consideration the fact that the rate of work has necessarily been limited by the financial status of the institution.

The introduction of fresh air into all the wards by the use of the indirect method of steam heating is not done in a uniform way in all the buildings. The supply of air for the wings is admitted into double fresh-air chambers or galleries in the basement, which extend the whole length of the building. These galleries are built of brick laid in cement. The outer gallery receives the fresh air through basement windows which are protected by wire netting from dust and other extraneous matter. From the outer gallery the air passes into the inner gallery through a series of openings which were left in the masonry for that purpose. The inner galleries are plentifully supplied with long coils of steam pipe which extend the whole length. The air enters the warming chamber at the bottom, and passing upward, is heated by the coils and sent upward to the rooms above.

In the pavilions, each ward or room has its own fresh-air supply which is not connected with that of any other, but runs entirely separate from its intake to its outlet in one of the rooms above. The steam coils in these buildings are placed in zinc boxes which are suspended from the basement ceiling and each is supplied with a fresh-air pipe of the same material and with a warm-air pipe which goes to a room above.

The foul-air ventilation of the old wings presents in the wards so incongruous an array of openings of various sizes, many of which are very small, placed at various altitudes from near the floor to near the ceiling, that the visitor does not have much expectation of finding good results upon more careful observation. In the oldest wing some of these foul-air openings are only 6 x 4 inches in size, but generally the movement of air through these small openings, as well as through the larger registers, was found to be very good, so that the combined work which is done by them gives results far better than was expected.

In the lower ward of the first wing on the male side, the air movement through three of the warm-air registers was taken and was found to average 250 feet a minute. Ten foul-air openings were tried and the slowest rate found was 80 feet and the most rapid 290 feet. The average rate for the ten was 177 feet. Wolpert's air tester showed 5.4 parts of carbonic acid in ten thousand of air. This ward contains 20 inmates. Temperature, 77°. /

The air of the middle ward of the same wing had 8.7 parts of carbonic acid. The temperature of the room was 73°, and there were 23 patients.

In the second and third wings, the movement of the air through the registers, and the amount of carbonic acid were taken only on the middle floor as presumably representing more nearly the average condition of the three wards in each wing.

In the second wing, the average rapidity of the current through the warm-air registers was 280 feet a minute, and the average for the five outlets tested was 80 feet. Two of these showed no movement, however. The carbonic acid figure for this ward is 11. The temperature was 73°, and there were 28 inmates.

In the third wing, the air movement in only three of the inlets, and the same number of the outlets, was taken. The average rate of movement at the warm-air registers was 316 feet, and, at the foul-air registers, 330 feet. There were found to be 14 parts of carbonic acid. The temperature was 74°, the number of inmates, 27.

As each pair of wings, first, second and third, were built at the same time, upon the same plan, and the same changes in the ventilating arrangements have been made on each side, it was thought that the observations which were made in the male wings would be a fair representation of the conditions which prevail on the other side; therefore, they were not duplicated.

In the pavilions the corridors are 130 feet long by 14 feet wide. The rooms on each side are 13x9 feet. The ceilings are 12 feet in height on the first floor and 11 feet on the other two floors. Each ward contains 16 rooms and averages 16 inmates, including the attendants. The registers in the rooms and corridors, both outlets and inlets, are of the same size, 12x8 inches. There are 18 warm-air registers in each corridor, and the same number of foul-air registers. The inlets are placed near the ceiling, and the outlets near the floor. Each room also contains one inlet and one outlet.

The following shows the average rate of movement through the fresh-air inlets and foul-air outlets of the three wards of the male pavilion as well as the amount of carbonic acid found, the temperature of each room, and the number of inmates which it contains:

*Lower Ward*—Inlets, 208 feet; outlets, 132 feet; carbonic acid, 4 parts in ten thousand; temperature, 68°; number of inmates, 11.

*Middle Ward*—Inlets, 201; outlets, 102; temperature, 71°; number of inmates, 15.



*Upper Ward*—Inlets, 221 ; outlets, 69 ; carbonic acid, 6.3 parts ; temperature, 74° ; number of inmates, 15.

Observations were made in only the middle ward of the female pavilion, and the following shows the results of them ; Inlets, 200 ; outlets, 110 ; carbonic acid, 7.4 parts ; temperature, 69° ; 16 inmates.

It will be noticed that the results which were given by the air test were remarkably good, particularly in the lower ward in the male pavilion where an amount of carbonic acid was indicated hardly exceeding the normal for the outdoor atmosphere. Half of the registers of each kind in each ward, viz: eight of each, were tested, and a reversion of current or want of movement was found in only five out of the sixty-four outlets and inlets which were examined.

#### *Plumbing and Drainage.*

We were pleased to note within the buildings, that there was manifest in the renovation of old and projection of new work an intelligent comprehension of the main principles under which we may largely expect freedom from nuisance, and the ills incident to sewer gas. Imperfections in certain minor details were evident, and they were minor, only because the rule of placing all pipe lines and fixtures in view, and subject to continual inspection, has been followed. Some of the imperfect joints noted may have been carelessness on the part of the plumber, others were perhaps due to the changing conditions peculiar to most new buildings, others to inherent faults between the principles and the conditions under which they may be maintained. This last refers more particularly to defective leaded joints generally found in long nearly horizontal lines of soil pipe when placed or used in a manner to be subject to wide ranges of temperature. To further explain our meaning: Certain sections of the sewerage system of a large asylum building may be internally flooded alternately with large quantities of hot and cold water, or, as is perhaps more prominently the case in the State Insane Hospital, the conditions in a part of the basement have been favorable to sudden wide ranges of external temperature. The direct effect of such conditions upon sewer pipe put together with lead calked joints is as follows: Heat expands the lead in the hub of the pipe so much more rapidly and extensively than it does the iron, that the lead partly leaves the hub to satisfy the conditions of increased volume, and in so doing it changes its form, so that when contraction takes

place its new form is no longer one to make a tight joint. Your Committee has observed cases where the daily, almost hourly wide ranges of internal temperature in pipes, has served practically to push the lead calking quite out of the joint. The action was undoubtedly supplemented by the sediment that formed behind the lead, which the lead subsequently pushed against in its next expansion. The above were the conditions that we think account to a certain extent for the defects noted, and we are not prepared to advise methods of remedy, other than frequent inspection and repair by recalking the joints. The defect incident to the wide ranges of external temperature in the basement, will we think, be largely remedied by what Dr. Sanborn has already done, and by his contemplated placing of more heating pipes in the section where the sewer pipes have been so much exposed.

The advocates of the wrought iron, screw joint sewer pipe system, notably the Durham company, claim that it is not subject to the class of defects above noted. It is evident to us that there are certain advantages in such a system, and we would advise the State in its new hospital building to plumb it with wrought iron, screw joint pipes.

An examination of the operation of the fresh-air inlets, developed that some of them were subject to occasional outward puffs of bad air but such ones were well placed as against harmful results.

The constant passage of a large amount of water in the soil pipe, supplemented by intermittent discharges of still larger quantities from baths, makes the ordinary location of a fresh air inlet impracticable. It is none the less necessary as a feature in safe plumbing, but it may be necessary to plan carefully its position, and, perhaps, extend it on the wall to a point above all windows. In regard to the conditions at the outfall of the sewer, which is of iron, and the subsoil drainage system, which is of vitrified pipe, and at which outfall point the two drains arrive and discharge nearly together, we would suggest that the sewer proper be continued somewhat further on in tight pipes in order that the chances of bad atmosphere passing up the subsoil drain might be removed. We understand that little or no nuisance arises from the present way of disposing of the sewage, *i. e.*, partly by surface irrigation, but mostly by an open ditch to the river.

It was evident to us that the time was not far off, when a more thorough treatment of this department would be necessary, but we saw no serious obstacles to arriving at a satisfactory state whenever the conditions demand a change of present methods.

A very great sanitary improvement has been made in the second and third wings on both sides by placing the bath and water-closet rooms of each wing in juxtaposition, as is represented on the plan at B and B, and building a ventilating well between them. An upward current is maintained by the help of steam coils in the base of each well. At all times, when observations were made, there appeared to be a powerful upward draught in these shafts. Each of the twelve bath rooms which are grouped about these two ventilating wells, contains a short hopper closet, stationary wash-bowl, slop-hopper and porcelain bath.

The same renovation of the plumbing in the first wings is needed and it is the intention of the management to have this done as soon as the finances of the institution will permit. The improvements which the changes of the past few years have made in the second and third wings can be appreciated by comparing the present condition of their plumbing with that which still remains in the first wings. Particularly in the first wing on the female side the need of change is very urgent. The closets are of an antiquated pattern and have long since ceased to be safe if they ever were, which is doubtful.

#### *Water Supply.*

The water supply of the Insane Hospital has a triple source.

The principle source of the drinking water supply is a spring situated in the woods on the upper and back part of the farm at a distance of a mile and a quarter from the Hospital and at a distance from all sources of pollution. A chemical analysis of this water made in the laboratory of the State Board of Health shows it to be a water of the best quality. The chemical examination gives the following results, expressed in parts per 100,000: Odor, none; color, none; total solids, 5.40; loss on ignition, 2.00; hardness, 3.25; chlorine, .4; free ammonia, none; organic ammonia, .0025; nitrous acid, and nitric acid, very slight traces.

This water is introduced into every ward in all the wings and the two pavilions.

The present supply of drinking water for the help in the engine house and laundry building is the old "Ash Tree Fountain," as it is called, a large spring which is situated above the Hospital and below Hospital Street. The question was under consideration whether this water should be introduced into the new building at a lesser cost, or the water from the other spring at a greater cost. A sample

of the water which was examined at the office of the State Board of Health gave the following results :

Odor, none ; color, none ; total solids, 11.8 ; loss on ignition, 4.2 ; hardness, 7.43 ; chlorine, .8 ; free ammonia, none ; organic ammonia, .0004 ; nitrous acid, slight trace ; nitric acid, heavy trace. This, as far as a single analysis could decide, showed the water to be of unexceptionable quality and it has recently been introduced.

A third supply of water is furnished by the Augusta Water Company.

### *Fire Protection.*

An enumeration of the provisions in the Hospital for guarding against the danger of fire, or extinguishing it in case it should arise, and for the escape of the patients and the attendants from their rooms might make it seem that nothing further is required, yet, knowing the difficulty of safely removing insane patients in case of fire, it is Dr. Sanborn's wish to make still another provision for safety as soon as it is feasible, by adding external fire escapes to one or more windows in connection with each ward.

In every wing and pavilion of this institution\* there are one or two stand-pipes, which are shown on the plan at (o, o). Each stand-pipe is provided with a fire plug and hose wound on a reel, ready for an emergency, in five different places, to wit: in the basement, in each of the three wards and in the attic. A fire starting in any place in the building could have almost instantly the streams from two or three hose at least turned upon it.

For chances of egress in case of fire, besides the doors which lead from one wing to another, each wing and pavilion has, at least, two flights of stairs which lead directly down from each floor to the ground.

In making our report to the board, which authorized our visit to the asylum, the knowledge that the Superintendent, Dr. Sanborn, has desired our visit and comments, has made the report take somewhat the form of recommendation in certain particulars. We were received by Dr. Sanborn and afforded every opportunity to see what was possible, and we are glad to bear testimony to the progressive tendency in sanitation that abounded in his methods.

E. C. JORDAN,	} Committee.
O. A. HERR.	
J. O. WEBSTER,	
A. G. YOUNG,	

## WATER ANALYSIS.

The water supply of our State, upon the whole, is probably better than that of any other State in the Union. The settled, as well as the wilderness part of the State, contains a remarkable number of lakes and ponds, many of which furnish water of the best quality for drinking purposes. Many of the rivers and streams have their origin in the lake systems of the uninhabited districts, and preserve their purity until they arrive at our villages and cities. Springs are numerous everywhere, and the crystal clearness of their waters shows how complete has been the process of filtration through the earth. Wells, when dug or bored in fitting places, almost always yield waters of very great excellence. On the other hand, there are ponds and streams which are free from any chances of animal or human pollution, but, nevertheless, contain an amount of vegetable organic matter, which renders them undesirable as sources of drinking water supply. Wells, too, are very often sunk where no reasonable being could hope that their waters should remain good. No better drinking water can possibly be found than the water of the average well, the location of which has been intelligently decided by a consideration of the present and prospective possibilities of defilement; but in point of fact, the great majority of wells in cities and villages furnish water which is at all times a possible source of ill health, especially for the feeble, and may at any time become positively dangerous for all persons. There is a general concurrence of opinion among sanitarians and physicians that impure water is one of the potent causes of disease. The necessity, therefore, of a careful study and jealous watchfulness of our water supplies is very apparent.

Influenced by these considerations, the State Board of Health authorized the Secretary to fit up a laboratory for water analysis, in connection with his office, and the work of making the examinations of samples of drinking water was begun in September. The purpose is to make this department helpful to local boards of health and to physicians, in determining whether suspected waters are chemically pure or otherwise. In the immediate future, it is proposed to make, also, a careful and extended study of the character of the supply which is offered by the various water companies.

The following tabulation exhibits the results of the first three and a half months' work in the laboratory for water analysis:

## ANALYSES EXPRESSED IN PARTS PER 100,000.

Number of Analyses.	Origin of Sample.	Total Solids.	Loss on Ignition.	Hardness.	Chlorine.	Free Ammonia.	Organic Ammonia.	Nitrous Acid.	Nitric Acid.
3	Well, Western Ave., Augusta.....	28.8	.....	12.56	1.3	.005	.007	Trace.	Some.
4	Well, cor. Gage and Swan streets, Augusta.....	16.8	5.6	10.30	.9	.006	.017	Trace.	Trace.
5	Well, Chapel street, Augusta.....	52.2	18.8	21.19	7.6	.006	.013	Trace.	Trace.
6	Well, Garland.....	13.2	6.0	7.43	1.2	.008	.008		
7	Webber pond, Vassalboro'.....	3.6	1.6	1.56	.4	.003	.038		
8	Kennebec river, tap in State House.....	3.8	1.6	2.21	.3	.001	.017		
9	Well, cor. Chestnut and Lincoln streets, Augusta.....	18.2	7.8	6.29	1.8	.004	.007	Trace.	Heavy trace.
10	Spring, tap in State House.....	11.0	3.4	7.43	.4	.000	.001		
11	Well, Winthrop.....	21.8	12.2	11.05	5.0	.008	.030	Some.	Heavy trace.
12	Well, Gardiner.....	25.8	16.6	19.29	3.9	.001	.003	Trace.	Heavy trace.
13	Well, south and Grove street, Augusta.....	4.8	2.8	1.95	.7	.026	.012	Trace.	Trace.
14	Well, Standish.....	20.6	6.2	3.25	3.3	.003	.014	Much.	Much.
15	Well, Brunswick.....	21.6	9.6	6.71	2.1	.007	.017	Much.	Much.
16	Well, ".....	11.8	5.2	6.71	1.3	.002	.009	Slight trace.	Trace.
17	Androscoggin river, tap, Brunswick.....	4.6	2.6	1.95	.4	.003	.019	Trace.	Slight trace.
18	Well, Danforth.....	13.4	8.2	6.00	.1	.002	.007	Trace.	Much
19	Well, Standish.....	10.0	4.2	2.86	2.6	.003	.007	Trace.	Heavy trace.
20	Well, Hermon.....	4.8	2.6	3.90	.4	.003	.008	Trace.	None.
21	Well, Kenduskeag.....	16.6	7.0	8.14	1.1	.000	.004	Trace.	Much.
22	Well, Oakland.....	14.0	11.6	2.21	2.2	.003	.007	Trace.	Much.
23	Well, ".....	.....	.....	1.56	2.0	.005	.047	Trace.	Much.
24	Well, ".....	7.2	4.8	.....	2.4	.002	.013	Trace.	Heavy trace.
25	Well, ".....	15.0	7.2	.....	2.8	.001	.006	Trace.	Heavy trace.
26	Well, Jonesport.....	12.4	3.4	2.60	1.5	.000	.008	Slight trace.	None.

27	Meduxnekeag stream, tap, Houlton.....	8.6	4.8	4.57	.2	.000	.015	.....	Slight trace.
28	Ditto, collecting crib.....	7.8	4.0	5.29	.5	.002	.014	.....	Slight trace.
29	Well, Court House, Houlton.....	40.4	19.4	28.12	5.6	.002	.004	Trace.	Much.
30	Well, Castine.....	50.4	23.6	16.75	5.7	.001	.013	Trace.	Much.
31	"Diamond Spring," Augusta.....	11.4	4.8	7.43	.6	.000	.001	None.	Trace.
32	Kennebec river, tap, State House.....	3.0	1.0	2.60	.4	.000	.013	.....	None.
33	Cistern water, Gage street, Augusta.....	8.8	4.8	4.57	.2	.019	.033	.....	None.
34	Spring, R. K. station, Augusta.....	44.6	18.8	13.61	7.0	.000	.005	.....	Much.
35	Cistern, Sewall street, ".....	7.0	4.2	3.90	.4	.003	.047	.....	Trace.
36	Well, " " ".....	19.6	9.6	11.05	2.2	.005	.004	Trace.	Heavy trace.
37	Well, cor. Capitol and State streets, Augusta.....	56.8	20.8	12.56	9.6	.023	.004	Slight trace.	Much
38	Well, State street, Augusta.....	34.2	12.8	23.12	3.4	.001	.013	None.	Slight trace.
39	Spring, tap, Norway.....	9.2	2.4	9.57	.2	.000	.004	None.	Slight trace.
40	Spring, " " ".....	4.6	2.8	3.51	.2	.001	.002	None.	Slight trace.
41	Well, Elm street, Augusta.....	29.8	15.6	8.14	6.2	.003	.009	Slight trace.	Much.
42	Well, Weston " ".....	23.8	17.0	13.31	4.0	.012	.017	Slight trace.	Heavy trace.
43	Well, Grove " ".....	.....	.....	8.14	3.8	.008	.009	Slight trace.	Heavy trace.
44	Well, State " ".....	6.4	1.0	3.90	1.0	.018	.003	Slight trace.	Slight trace.
45	Well, Jonesport.....	11.4	5.4	4.57	1.8	.001	.023	Much.	Trace.
46	Well, No. Bridgton.....	36.2	18.4	8.86	5.6	.012	.017	Much.	Much
47	Well, Ashland.....	27.2	12.0	20.40	1.2	.008	.005	Slight trace	Heavy trace.
48	Well, Brunswick.....	10.6	4.2	4.57	1.0	.000	.003	Slight trace.	Trace.
49	Well, Melville street, Augusta.....	58.4	35.2	16.43	7.4	.000	.001	None.	Much.
50	Well, Castine.....	70.8	30.6	29.68	8.6	.002	.031	Much.	Much.
51	Spring, Houlton.....	33.8	7.0	22.86	2.0	.000	.000	Slight trace.	Heavy trace.
52	Well, " ".....	76.8	8.0	32.86	19.2	.000	.009	Slight trace.	Much.
53	Well, " ".....	44.8	13.2	29.68	2.4	.002	.003	Slight trace.	Heavy trace.
54	Well, Bowdoinham.....	10.8	4.4	3.90	2.0	.000	.007	Slight trace.	Some.
55	Well, Oakland.....	68.6	21.0	23.34	7.6	.004	.004	.....	Much.
56	Well, Grove street, Augusta.....	19.8	8.8	8.14	4.0	.001	.002	Trace.	None.
57	Well, Wiscasset.....	12.8	6.0	4.57	3.4	.004	.012	Trace.	Heavy trace
58	Well, cor. State and Chandler streets, Augusta.....	17.0	6.2	8.86	2.0	.001	.005	Slight trace.	Some.
59	Cistern, Sewall street, Augusta.....	6.2	3.4	3.25	.6	.064	.023	Heavy trace.	Trace.
60	Well, Pemaquid.....	8.4	4.0	.....	1.5	.000	.021	.....	.....
61	Well, Grove street, Augusta.....	20.2	7.0	9.50	2.8	.000	.001	Trace.	Much.
62	Well, Springvale.....	20.0	9.6	.....	5.6	.392	.075	Some.	Much.
63	Well, School-house, Springvale.....	10.4	6.4	.....	2.8	.003	.004	Trace.	Some.
64	Estes spring, Auburn.....	4.0	2.2	2.60	.6	.004	.006	Slight trace.	Trace.

## NOTES ON SOME OF THE FOREGOING ANALYSES.

No. 3. This well, twenty-five feet deep, was dug in the summer of 1885. The lot was built upon the same season, and the house was occupied in the fall. In digging the well, a thin stratum of loam was passed through, then for several feet an exceedingly tenacious hardpan, next a thick layer of pure blue clay, and, finally, gravel, in which the water was found. No sources of pollution exist excepting in a shallow privy-vault, situated fifty feet from the well, and on slightly higher ground than the surface at the well.

No. 4. An analysis of the water from this well was desired, on account of the presence of typhoid fever in some families, where the water had been used. The well is situated on rather low ground at the junction of two streets; and, as it is somewhat exposed and has not been cleaned out for years, it was recommended that this should be done, and a subsequent analysis made to determine whether the character of the water would be improved by the cleansing.

No. 5. This well, situated in the yard near a house, is about twelve feet deep, and had five feet and a half of water in it at the time the sample was taken. The distance of the sink-drain from the well is twenty feet, and that of the privy forty feet. Seven other privies are enumerated within one hundred and twenty-five feet of the well. The family using the water from this well complained of headache much of the time, and a dull tired feeling in the morning. Sore throat, also, has been quite a frequent trouble with them. This water is badly polluted.

No. 6. The well from which this sample was taken is about twenty feet deep, and is situated twenty feet from the sink-drain, thirty feet from the privy, the same distance from the stable, and fifty feet from the barnyard. The soil and subsoil are not deep and the ledge comes very near the surface. The discharge from the sink-spout flows within ten feet of the well, and the slope of the ground, at the surface, at least, would favor its drainage into the well. Microscopically there was found a great abundance of organisms in the sample, *oscillaria*, *anguillula*, *uvella*, *rotifer* and others. Four cases of typhoid fever had recently occurred in the family using the water and their general health has not usually been good. Frequent complaint is made of sore throat. One member of the family is affected with melancholia, and another was similarly afflicted several years ago. The physician sending the sample writes that, four year



ago, there were under his care in the family one case of erysipelas, six or more of tonsillitis, three of scarlet fever, and three of typhoid fever.

No. 7. About the middle of September, a bottle of water was brought to the office, and a few days after a letter was written by the intelligent collector of the sample, from which the following is a quotation :

"The day on which I took the specimen, left at your office (Sept. 7), the pond was perfectly calm, and presented a most remarkable appearance, being covered with a yellow scum, thicker over some areas than others, but covering the whole surface so far as visited, and we rowed over about two miles of its length and probably two-thirds of its width. Floating in this scum, were detached masses of matter varying in size from a bean to a man's hat, and of different colors, white, yellowish, green, blue, thicker in some places than others, but always present. Over some areas these masses were very thick, making the water look like "marbled paper." About noon a wind came up, and on our return (about 4 P. M.) very little of either scum or flecks were to be seen, being churned up by the waves, and giving the water a turbid, green appearance.

This morning I went to the pond, and rowed out about half a mile, but there was quite a breeze and the water was choppy. I saw none of either the scum or flecks, although I looked carefully along a lee shore. The water, however, looked dirty, and was filled with small stringy masses, which, on close examination, I found to be the remains of the former phlegm-like masses, broken up by the waves. I brought home a bottle of the pond water, containing as much of this stringy matter as I could collect by repeated dippings.

I would like very much to have your opinion on the origin of the yellow scum and the nature of the mould (for such I assume it to be) and if it has any pathological significance. In 1858 or 9, a malignant type of typhoid fever broke out in the neighborhood of this pond, causing several deaths. The pond at that time was low and the yellow scum present, and to this day the people here connect the pond with the fevers at that time."

The "scum" of which our correspondent wrote, was composed of a microscopic plant and its gelatinous sheath, which appeared to be a nostic. As the water is not used for drinking the appearance of this plant could have no "pathological significance."

No. 8. (See No. 32.)

No. 9. This well, in a cellar beneath a dwelling house, is six or seven feet in depth below the floor of the cellar. Privy with box vault twenty feet distant; cess-pool into which sink-drain from kitchen discharges, sixty feet away. The relative location of these things, as regards the well would make us regard this water with some suspicion. Probably the reason why worse chemical results are not

shown is that the lot is situated near the upper margin of the city, and the surface declines and the ground-water flows from the well towards the vault and cess-pool.

No. 10. The spring water in the State House comes from the hills west of the capitol. Chemically and otherwise it is a good spring water. A part of the way the aqueduct is a leaden pipe, but repeated tests have not shown the presence of lead in the water. It is a water of moderate hardness, and this is one safeguard against the solution of the lead by the water.

No. 11. This is a very old well, about twelve feet deep, and it was about half full of water when the sample was taken. The privy is four rods from the well. The soil and subsoil are gravelly. Eight years ago, a case of typhoid fever occurred in the family, since which time they have been afraid to use the water. Sometimes when the water is low, it has a bad odor. The fear to use the water must be considered salutary. Chemically the water is very bad, and microscopically it is even worse. A profusion of minute organisms was found: *amœba*, *actinophrys*, *anguillula*, *colpoda*, *astasia*, many ciliated and non-ciliated infusoria and spores of fungi.

No. 12. This well, in a portion of the city which is somewhat closely built, has a sink-drain twenty-five feet, a stable fifteen or twenty feet, and a privy forty feet from it. Yet, on account of its depth and the impermeable strata which it passes through, its water is protected in a considerable degree from the most objectionable forms of pollution from surface drainage. The well is forty-six feet deep, and in the digging the following strata were passed through loam and clay, 18 feet; blue clay, 20 feet; sand, 9 inches; and beneath it in coarse gravel the water was found. The height of the water is not affected by rains. There is nothing in the chemical examination which denotes pollution, excepting the too high figure for chlorine and considerable nitric acid, and these possibly do not have their origin from sources of filth on the surface.

No. 13. This well is thirty or forty years old, and is about forty feet deep, with probably only two or three feet of water in it at the time the sample was taken. The water is raised with a wooden pump. The ground where the well is located is level, but immediately descends steeply to a swamp in which water stands at probably about the same level as the surface of the water in the well. Slops of all kinds are thrown out around and near the well. The water has a disgusting smell. It was employed for drinking and culinary purposes until recently, when its bad odor caused a discontinuance

of its use. Two cases of typhoid fever had recently occurred in the house. An abundance of vorticellæ, anguillulæ, and other organisms, characteristic of polluted water, were present.

No 14. This is an old well, sixteen feet deep, and was about half full of water at the time the sample was taken. The distance from the well to the sink-drain is seventeen feet, to the privy twenty-seven feet, stable forty-five feet, barn-yard thirty-five feet and to the pig pen the same distance. Diphtheria occurred in the family immediately before the analysis was made. It is reported that before moving into this house, about a year ago, the health of the members of the large family had been good; but that, since their residence in this place, nearly all have been in poor health. Sore throat has been prevalent.

Nos. 15, 16 and 17. The first two were drawn from wells used by the French population of Brunswick as a drinking-water supply, and the last was taken from the public water supply.

No. 18. The soil and subsoil in which this well was dug are light loam and gravel. The well is fourteen feet deep, and the water was about six feet deep, when the sample was taken. The sink-drain, privy, stable, barn-yard, etc., are distant from forty-five to seventy-five feet from the well. The free ammonia and organic ammonia figures indicate about the maximum quantity of these two constituents, which are permissible in a well water of unexceptionable quality, but the chlorine figure is very low.

No. 19. This well is situated at the edge of a swale which takes the surface drainage from several acres of land, and also from some buildings, and carries it within a few feet of the well, in the spring and fall. A sink-drain, privy and stable are situated all within sixty feet of the well. The depth of the well is twelve feet, and the last of September, when the sample was taken, the water was five feet deep in it. Microscopically there were found many cotton fibres, some woody tissue, a few specks of iron rust, derived from the ferruginous gravel in which the well is sunk, a rotifer, infusoria, and fragments of an alga, apparently a chroolepus. A well, situated as this is, is liable at any time to become infected with pathogenic germs, and the water should never be used for drinking.

No. 20. This sample came from a well, drilled fourteen feet to a ledge, where it reached water, which rises to the surface. The water rises into a cemented reservoir, six feet square and six feet deep, whence it is carried about one-third of a mile, the most of the way through a log aqueduct. There are no buildings around the well,

and it is reported that there are no sources of pollution. Some of the free and organic ammonia are undoubtedly derived from the wooden aqueduct. Microscopically anguillula, oscillaria, a small amoeba, and a great abundance of bacteria were found, the latter consisting of motile long rods, spirilli, very active and abundant, and short rods not as abundant as the other two forms. A case of typhoid fever existed in the family when the sample was taken.

No. 21. The well from which this sample came is situated dangerously near sources of pollution, and the water at the time of the analysis was much better than could be expected. The land, however, slopes so that the drainage is carried from the well. There is no history of sickness in connection with the using of the water.

No. 22. The well is in gravelly ground, is twenty feet deep and, October 13th, when the sample was taken, the water was three feet deep. The neighboring sink-drain and privy are respectively fifteen and forty feet away. There were two cases of typhoid fever in the family, when the analysis was made.

No. 23. The distance from this well to the sink-drain and privy is about sixty feet, and to the stable and barn-yard about twenty feet. The surface of the ground at the well is rather lower, than where the probable sources of pollution are. A first case of typhoid fever had been imported into this house, and a second person had become ill with that disease when the sample of water was gathered, near the middle of October. This water is badly polluted.

No. 24. A well in gravelly soil, ten feet deep, with about three feet of water. The sink-drain, privy and stable are distant from the well twenty, thirty and forty feet respectively. Bacteria and infusoria were abundant. One member of the family was thought to be developing typhoid fever, when the sample was sent. This is a bad water.

No. 25. There were two feet of water in the fifteen feet well. The sink drain is twenty, the privy thirty-five, and the stable forty feet from the well, which is in the cellar. No history of sickness is given; but this must be considered a suspicious water, on account of the likelihood of drainage from dangerous sources. The chlorine figure and much nitric acid would also increase the suspiciousness of the water.

No. 26. The nearest sources of pollution for this well are the privy and barnyard, which are situated respectively fifty-five and

seventy-five feet from it. There has been considerable sickness of various kinds among the three families which use the water, and several deaths have occurred. Quite prevalent symptoms have been headache, sore throat, rheumatism, dyspepsia, irregularity of the bowels, and general debility. The results of the chemical examination would hardly be sufficient to condemn the water; but it is always very turbid from clay, which is held in suspension, and this condition of the water would be sufficient to account for some of the troubles, which have just been enumerated. Cyclops is very abundant in the water.

Nos. 27 and 28. These samples were taken from the public water supply of Houlton. The source of the supply is the Meduxnekeag creek, which, for most of its course, flows through land covered with forest, and, for only the last few miles, through a farming country, with not many houses near the stream. This water may, therefore, be taken as a fair sample of the water which is furnished by the rivers and creeks of this State, when they are not subjected to sources of pollution. The quantity of organic ammonia found in such streams is always larger than that found in wells and springs, which are favorably located; but, with the guaranty of non-pollution, the amount of organic ammonia, which is found in this water, does not make it unsuitable, as a public water supply. The water is pumped from a collecting crib above the village into a stand-pipe on a hill back of the town. No. 27 was taken from a tap in the public square, and No. 28 directly from the collecting crib.

No. 29. This well was drilled fifty feet through a ledge. It is on a high knoll, and sources of pollution are not very near, say 100 feet. This is a very hard water, as most of the well waters of Aroostook county are, being derived from a limestone formation. The amount of chlorine, also, is large; but not enough is known of the normal chemical constitution of the well water in that part of our State, to exclude the possibility of its derivation from the geological formation. The possibility of sewage pollution is strengthened by much nitric acid.

No. 30. The lot, on which this well is situated, has been occupied by buildings many years. The well is in the cellar, and is fifteen feet deep. The distance from the sink-drain to the well is nineteen feet, and from the privy seventy-five feet. The well was full of water at the time the sample was taken, (Oct. 12). The water has been observed at times to give off an unpleasant odor,

when it is heated. It was reported that the effect of the water upon those, who are unaccustomed to using it, has been to cause diarrhœa. The users of the water have also been subject to head-ache sore throat, irregularity of bowels, and a depressed state of mind. During the season an infant in the family had died of cholera infantum, and a young man of typhoid fever. The sample of water contained infusoria in abundance. The chemical results would mark it as a badly polluted water.

No. 31. The sparkling clearness of this water justifies the fanciful name of the spring. Chemically and microscopically it is a water of the best character.

No. 32. The sample for analysis, No. 8, was taken September 20th, and this one, October 18th. At the time of the last analysis, the water presented a peculiar milky appearance, due to the admission of air into the main during the making of some repairs. When the water was re-admitted to the pipes, the pressure of the 150 feet head upon the imprisoned air forced it into the water, and strongly ærated it. The analysis of the water under these conditions shows a marked diminution of the two kinds of ammonia, and a slight diminution of the figures representing the total solids and loss on ignition. The difference in time, however, precludes the possibility of drawing any conclusions as to the part which the æration may have had in diminishing the ammonia figures.

Nos. 33, 35 and 59. These three samples may be taken as fair representatives of the condition of ordinary cistern water. Of these, only No. 59 was used as a drinking water supply; and the analysis of this was made on account of the prevalence of diphtheria in the family, two children of which died of this disease.

No. 34. The sample came from a spring, which is labeled "Pure Spring Water," situated near the railway station. It oozes out of the ledge at the foot of Oak street, and above it, on the steep hill-side, are crowded together many residences, with all their possibilities for pollution. The drainage from these houses, in filtering through the soil above the ledge, is undoubtedly one of the sources of the constancy of this little water supply, though its quantity varies considerably at different times. As only the figures representing the chlorine and nitric acid are high, the probability is that the filtration through the soil has oxidized some of the more objectionable forms of pollution.

No. 36. This well, near the upper margin of the polluted water table of the city, furnishes a water which is better than the average well water of cities, yet is open to some suspicion of slight pollution, on account of the rather high figures representing its chlorine, free ammonia, and nitric acid.

No. 37. The bad character of the water in this well is perhaps due in part to the fact that there is, five or six feet from the surface, an impermeable hardpan, which has a sharp inclination towards the well from the point at the corner of the street, where the sewer from the State House and the drains from some of the private residences cross.

No. 38. This well has no sources of pollution very near it, but is situated at the lower edge of a flat and thickly built portion of the city. It is not a good drinking water.\* It will be observed that it is a much harder water than that from most of the other wells in this town.

\* Nos. 39 and 40. These are spring waters of good quality, excepting that in the case of No. 39, it is stated in the application blank that "a scum rises in boiling, and a white sediment settles when cooled." The water is brought 4,000 feet through a two-inch galvanized iron pipe, and the sediment observed is due to zinc, derived from the coating on the interior of the pipe.

No. 41. This well is in a thickly built portion of the city, and has for near sources of pollution, sink-drain, privy and stable, at distances of from thirty to forty feet. The well is thirty feet deep. The chemical analysis shows the water to be polluted; and, microscopically the sample was very interesting for the great abundance and considerable variety of the infusorial organisms. Bacteria, consisting of short and long rods and spirilli, were also abundant.

No. 42. This well, twenty feet deep, has a privy and stable about two rods from it, and the closeness with which this part of the city is built up places the well within the influence of neighboring sources of pollution. There has been considerable history of illness of various kinds, which might reasonably be ascribed in part to the use of this water, which is bad.

No. 43. This well is in a crowded part of the city, where the ground water is all badly polluted.

No. 44. This sample had six or eight times as much free ammonia as a good well water should have, and an abundance of infusoria present in the water strengthens the unfavorable opinion.

No. 45. This well is situated at a considerable distance from any buildings, but close to the road, and in ground somewhat lower than the highway. The amount of organic ammonia which the water contains is five or six times as great as should be found in well water. Possibly careful cleansing of the well, and its protection from the dust of the highway and surface wash would favorably change the character of the water. Cotton fibres, entomostraca, amœbæ, and ciliated infusoria were abundant with some spirilli and short rod bacteria. The water had considerable odor, and was slightly turbid.

No. 46. The well from which this sample came is twenty-three feet deep, and, Nov. 4th, when the sample was taken, there were about two feet of water in it. The well is thirty-seven feet from the sink-drain, ninety-five feet from the privy, and twenty feet from the pig-pen; but the land slopes decidedly from the well towards these possibilities of pollution. The chemical constitution of the water is that of a badly defiled and dangerous water.

A large quantity of sediment was present, and in it a very great variety and abundance of both vegetable and animal organisms were found, among which were a nostoc, oscillaria, chaetophora, amœba (two species), rotifer (two species), anguillula, and ciliated infusoria. Cotton and linen fibres, wood fibre (pine) and particles of iron rust were detected. It should be stated, in this connection, that the sample was collected eight days before the analysis was made. A case of typhoid fever had occurred in the family at this place, in the person of a young man, and his father, the lamented Prof. John Avery, of Bowdoin College, going there to care for his son during his sickness, contracted the disease, which terminated fatally.

No. 47. The chemical analysis of this sample leads us to class it as a doubtful water. The results are not good enough to raise it above suspicion, and not bad enough to condemn it absolutely. The well is not favorably situated, being within a stable and sixty feet from a barnyard and pig-pen. The latter, however, are on ground considerably lower than that at the surface of the well. The well is about twenty feet deep, and had six or eight feet of water in it, when the sample was taken, Nov. 10. Three cases of typhoid fever had occurred among the users of the water.

No. 48. No history of this sample was received.

No. 50. This sample was sent, not because there was any history of sickness connected with its use, but because, so far as



locality is concerned, it is a fair representative of the majority of the wells in the town whence it came. The ground has long been occupied by buildings, but the well was dug only last year. It is seventeen feet deep, was full of water when the sample was taken in November, is eight feet from the sink-drain, and from fifty to sixty feet from a privy, stable, and barnyard. The soil is sandy loam, and the subsoil the hardest kind of stratified, blue clay. The ground slopes from the stable and privy towards the well, but from the well towards other possible sources of pollution. Exceptional care was taken in this unfavorable location of the well to guard against the entrance of sewerage. It was walled up with stone seven feet from the bottom, and from there up ten feet was laid with two courses of brick, filled in between with cement and laid in cement. Ten feet below the surface, a cemented drain was made entirely around the well leading to the street gutter below. The sink drain is also built of brick laid in cement and discharges into the gutter twenty-five feet below the well. In spite of these precautions a glance at the results of the analysis will show that the water is badly contaminated. Cyclops was very abundant, and also spirilli, micrococci and a bacillus, consisting of slightly curved rods of various lengths, arranged in stellate groups or woven into catkins with one extremity of the rods free. These rods were not motile. The sample was examined forty-eight hours after collection.

No. 52. This well, about twelve feet deep, is situated near a variety of buildings, one of which is a store. The analysis indicates pollution of the water; but it is surmised that the large amount of chlorine is not a constant condition, but that it may have been caused by pouring out fish or meat brine too near the well.

No. 54. This well is only ten feet deep, and, in the latter part of November, when the water was taken, it was nearly full of water. A privy and a stable where one horse is kept, are situated four or five rods from it and on higher ground. The chemical examination gives no decisive results. Microscopically, actinophrys and various ciliated infusoria, which prefer polluted water, were abundant. One member in the family using the water had recently had typhoid fever in a mild form, and another, at the time the sample was sent, had a mild diphtheria.

No. 55. This well is forty feet deep. The sink drain is on the other side of the house, thirty-five feet distant from the well, and

the privy is fifty feet away, both of them on ground much lower than the well. No history of illness is given.

No. 56. This well is only from twenty to twenty-five feet from the sink drain and the privy. The results of the chemical examination are better than could have been expected. The amount of chlorine is greater than appears to belong to normal well water in this region, and probably has its origin partly from sewage.

No. 57. This well was dug seven feet, and then blown three feet into a soft, soap-stone ledge. The water is said to boil up from the bottom of the well in two places very clear, and is never less than three feet deep. The well was full, when the sample was taken. The ground around is level. The water is said to have a bad taste after heavy rains. The well is sixty feet from the sink drain and thirty from the stable and barnyard. The general health of the family is said to be good. One member, sixty-eight years of age, has had no sickness for fifty years, and drank nothing but water for over twenty years. The man, who cleared this farm and dug the well over seventy years ago, passed the remainder of his days drinking the water of the well, and died at the age of nearly ninety-one. Nevertheless, the water is subject to pollution from surface drainage, and is not safe as a drinking water for the average human being. Neither does the immunity which many have from the ill effects of the poison ivy (*Rhus toxicodendron*) prove that all persons may handle that plant with impunity. Three years ago a girl in the family, twelve years old, had typhoid fever; but it is not known whether or not there was a causative relation between the water and fever.

No. 60. This sample was from a shallow well, dug in the edge of a swamp, which receives a small amount of sewage from a house situated higher up.

No. 62. This sample was taken from a well, twenty feet from a barnyard, where the dirty water stands on the surface. The quantity of the sample sent was too small to give results free from suspicion of error. A second sample received, gave correct, but more unfavorable results, as follows: Total solids, 22; loss on ignition, 8; hardness, 11.80; chlorine, 5.4; free ammonia, 1.308; organic ammonia, .039. In the former analysis there was a known error, which diminished the amount of free ammonia and increased that of organic ammonia.

## ADDITIONS TO THE LIBRARY.

During the year 1887 the following books, journals, and pamphlets were added to the library of the Board by exchange and by purchase.

## BOOKS.

- Report of Health Officer of the Local Government Board, London, 12th, 13th, 14th, 15th, and 16th Annual Reports.
- Roth. The Elements of School Hygiene, London.
- Eisenberg. Bacteriologische Diagnostik, Hamburg u. Leipzig.
- Nauss. Ansteckende Krankheiten in der Schule. Wien.
- Tidy. The Treatment of Sewage. New York.
- Transactions of the Sanitary Institute of Great Britain, Vol. VII.
- Richardson. Health of Nations, 2 vols.
- Stricker. Allgemeine Pathologie der Infectiouskrankheiten. Wien.
- Index Catalogue of the Library of the Surgeon General's Office, Vol. VIII.
- Arbeiten aus dem Kaiserlichen Gesundheitsamte. Berlin. Vol. II.
- Sutton. Volumetric Analysis.
- Attfield. Chemistry. General, Medical and Pharmaceutical.
- Fox. Sanitary Examinations of Water, Air and Food.
- Staley and Pierson. The Separate System of Sewerage. New York.
- Report of the Commissioner of Education for the Year 1885-6.
- Transactions of the Medical Society of Pennsylvania. Vol. XIX.
- Annual Report of Philadelphia Water Department for the year 1886.
- Laberge. Report on the Sanitary State of the City of Montreal for the year 1886.
- Transactions of the New Hampshire Medical Society for 1887.
- Report of the Commissioner of Agriculture for the year 1886.
- Forty-Fifth Registration Report of Massachusetts.
- Sixth Annual Registration Report of New Hampshire.
- Ninth Annual Report of the State Board of Health of Connecticut.
- Manual of the Health Laws of the State of Ohio.
- Transactions of the Maine Medical Society for 1887.
- Forty-Fifth Annual Report N. Y. Board of Education, 1886.
- Second Annual Report of State Board of Health of Kansas.
- Eleventh Report of State Board of Health of Minnesota.
- Tenth Report of State Board of Health of New Jersey.
- Tenth Report of State Board of Health of Wisconsin.

Eighteenth Annual Report of State Board of Health of Massachusetts.

Ninth Annual Report of State Board of Health of Rhode Island.

Report of State Board of Health, West Virginia, 1885-1886

Biennial Report of State Board of Health, North Carolina.

Report of Provincial Board of Health, Ontario, 1886.

Report of State Board of Health, Connecticut, 1886.

First Annual Report of State Board of Health, Ohio, 1886.

Fifth Annual Report of State Board of Health, Indiana.

Sixth Annual Report of State Board of Health, New Hampshire, 1887.

Agriculture of Maine, 1886.

Lacassagne. Hygiene de Lyon.

Transactions of the New York Academy of Medicine. Vol. 5.

#### JOURNALS FOR 1887.

Index Medicus, Boston and Detroit.

Sanitarian, New York.

Sanitary News, Chicago.

Sanitary Engineer, New York.

Annals of Hygiene, Philadelphia.

Lancet, London.

Sanitary Record, London.

Vierteljahrschrift für öffentliche Gesundheitspflege. Braunschweig.

Zeitschrift für Hygiene, Leipzig.

Giornale della Reale Societa Italiana D'Igiene, Milano.

Revue D'Hygiene. Paris.

Journal of Comparative Medicine and Surgery. Philadelphia

Medical Record, New York.

Building, New York.

American Monthly Microscopical Journal, Washington.

Public Health in Minnesota.

Bulletin of the North Carolina Board of Health

Monthly Bulletin of the Iowa State Board of Health.

Bulletin of the State Board of Health of Tennessee.

#### PAMPHLETS.

Proceedings of National Conference of State Boards of Health, Toronto, 1886.

Baldamus' Medicin und Pharmacie, 1881-1885.

- Second Report of Board of Health, city of Hartford, Conn.  
Circulars of Information of the Bureau of Education. No. 2, 1886.  
Report of the Board of Health of the city of Fall River, Mass.  
Report of the Board of Health of Taunton, Massachusetts.  
Report of the Board of Health, Richmond, Virginia, 1886.  
Concerning Inspectors of Nuisances.  
Report of the Medical Officer of Health, Coventry, England.  
Report of the Board of Health, Newark, New Jersey, 1886.  
The Shone Hydro-Pneumatic System of Sewerage, Broughton.  
Report of Board of Health, Augusta, Maine, 1886-7.  
Report on a System of Sewage Disposal at Insane Asylum, Middletown, New York.  
Report of Commissioner on Sanitation adopted by School Committee, Lynn, Massachusetts, 1886.  
Annual Report of Inspector of Milk, Vinegar and Petroleum, Holyoke, Massachusetts.  
Report of Health Officer of the city of Newburgh, New York, 1886.  
Report of Board of Health of Gardiner, 1887.  
Report of Superintendent of Health of city of Providence, 1886.  
Report of Committee on Disinfectants, 1886.  
Angell. Sanitary Examination of Drinking Water.  
Rafter. On the Use of the Microscope.  
———. On the Use of the Amplifier.  
Tucker. Report of Analyst of Drugs, New York.  
Report of the Chemical Examination of the Waters of the Public Wells of Albany, New York.  
Report of the City Engineer in relation to the Disposal of the Sewage, Worcester.  
Report of Committee on Disinfection of Rags, 1886.  
The Preventable Causes of Disease, Injury and Death.  
Sternberg. Disinfection and Individual Prophylaxis against Infectious Diseases.  
Lincoln. Sanitary Conditions and Necessities of School-Houses.  
Vaughan. Healthy Homes and Foods for the Working Classes.  
Recommendations in regard to the care of Invalids.  
Report of a Public Health Conference held at Louisville, Kentucky, 1887.  
Public Health Acts.  
Acts respecting Vaccination and Inoculation, 1886. Ontario  
Report of the Quarantine System of the St. Lawrence, 1886.

Second Annual Report of the Board of Health of the city of Portland, 1887.

Care and Management of Infants and Young Children.

Sanitary School-Houses.

Report of Proceedings of Woodstock Sanitary Convention, May 17 and 18, 1887.

Rafter. How to Study the Biology of a Water Supply.

Observations of the Police Service and Physique in St. Louis.

The West System National Sewage and Sewage Utilization Company, New York.

The Durham System of House Drainage, New York.

Laws Relating to Public Health in New Jersey, 1887.

Prevention of Cholera Infantum and Kindred Diseases, Michigan Board of Health.

The Shone Hydro-Pneumatic System of Sewage, Chicago, 1887.

Report of the Commissioner on Cattle Disease, State College Farm, Orono. 1887.

Tenth Annual Report of Health Commissioner, St. Louis, Mo., 1886.

Bulletin. Ministere de L'Agriculture. Paris, Nos. 1, 2 and 8.

Inter-State Notification: Its Principles as Demonstrated in the History of Yellow Fever at Biloxi, Harrison Co. Miss, 1886.

The Public Health and its relation to Sanitary Drainage.

Twenty-Eighth Annual Report of the Inspector of Milk and Vinegar of Boston for the year 1886.

Fox. On the Determination of Nitrates in Potable Waters.

The Medical Examiners' Returns.

Fisk Fund Prize Essays, for 1879.

Report on the Purity of Ice in New York.

Eighth Annual Report of the Board of Health of the City of Atlanta. for 1886.

Rauch. Report of an Inspection of the Atlantic and Gulf Quarantines between the St. Lawrence and Rio Grande.

Annual Report of the Health Department of the City of Concord, New Hampshire, for the year 1886.

Fifteenth Annual Report of Board of Health of the City of Boston for the year 1886.

Ist der acute Gelenkrheumatismus eine Infectiouskrankheit.

Transactions of the Mass. Medico-Legal Society, Vol. I., No. 4, 1881.

Annual Report of the Public School Department of Hoboken, N.J., 1886.

## EXPENSES OF THE BOARD.

The amount and character of the expenditures of the Board for the year 1887 were as follows :

Engraving and drawing.....	\$12 19
Books and sanitary journals.....	245 09
Instruments.....	276 04
Paper and stationery ... ..	194 13
Postage .....	292 00
Printing and binding.....	454 72
Secretary's salary.....	2000 00
Expenses of members .....	115 51
Express and telegraph.....	169 02
Travelling expenses of Secretary.....	109 00
Clerical and laboratory help .....	202 37
Miscellaneous .....	26 80
Chemical and microscop. supplies ....	297 12

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Total..... \$4.393 99

EXTRACTS FROM THE REPORTS  
OF THE  
LOCAL BOARDS OF HEALTH.

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As the act which established the local boards of health did not go into effect until the middle of April, 1887, and many of the boards were not organized until much later, it is to be borne in mind that the following reports are not for the whole year.

In the towns whose names are included in the following list a local board of health had not been organized and reported to this office at the end of the year :

Albany, Amity, Appleton, Aurora, Brookton, Canton, Clifton, Deblois, Eustis, Fort Kent, Frenchville, Grafton, Grand Isle, Hershey, Jackson, Kingman, Kossuth, Lincoln, Lowell, Ludlow, Lyman, Otisfield, Passadumkeag, Perry, Sebec, Standish, Waltham, West Bath.

ABBOTT.

Members of the board : Jesse Barber, Esq., one year, Chairman ; Edwin Faunce, two years ; A. P. Raer, three years, Secretary.

The water supply of the town is from springs and wells. We have had occasion to remove one nuisance. No cases of diphtheria, typhoid fever or scarlet fever have occurred, but there were about twenty cases of measles one of which ended fatally. The schools are thought to be in good condition. Infected pupils were excluded during the prevalence of measles.

ACTON.

Members of the board : B. J. Grant, one year ; O. C. Titcomb, two years, Secretary ; Chas. N. Brackett, three years, Chairman.

No report received.



## ADDISON.

Members of the board: N. W. Curtis, one year, Chairman; N. H. Ingersoll, two years; F. A. Chandler, M. D., three years, Secretary.

It has been remarkably healthy for the year. There was but one case of scarlet fever and there have been no cases of diphtheria or typhoid fever. In the one case of scarlet fever which was reported to us we saw that isolation was carried out.

## ALBION.

Members of the board: C. W. Abbott, M. D., one year, Secretary and Health Officer; R. L. Baker, two years; Otis Meader, Esq., three years, Chairman.

There has not been a case of any of the specified diseases. The corpse of a person who died of diphtheria in New Hampshire was brought here but the interment took place with proper precautions and the infection was not communicated.

Dysentery prevailed here in August and September and appeared to be contagious, afflicting whole families. Two deaths resulted from it. The board made an investigation into the cause of the disease but could find no cause for its prevalence. The school-houses are all heated by stoves, and ventilated through windows and cracks in the walls. The out-houses generally in a bad condition. There have been but three nuisances come to our knowledge and they were rectified at once by a single notice from the board.

## ALEXANDER

Members of the board: Geo. B. Berry, one year, Secretary; C. M. Huff, two years; Jones A. Bohanon, three years, Chairman.

The water supply comes from wells and the water is generally good. There were no cases of typhoid or scarlet fever, but we had seven cases of diphtheria, three of which proved fatal. The disease was brought to this place from Calais by a young woman who had been working there and who came home sick with that disease. I visited the locality and gave the families instructions in regard to the necessary precautions, and gave them the circulars for that disease and the one on disinfectants, and I think the directions were followed as the disease did not spread. There have been no nui-

sances to deal with and there has been no special work to do excepting what has been reported.

#### ALFRED.

Members of the board: John T. Hall, one year; Sam'l M. Came, two years, Chairman; Frank W. Smith, three years, Secretary

Our water supply is principally from deep wells from 30 to 35 feet in depth, and the water is of the best quality.

One case of diphtheria occurred in July which recovered. There have been no cases of typhoid fever reported to the board, but I think there were three cases not reported which recovered. Fevers were generally less prevalent than usual. There have been no epidemics but we have been continually expecting something from some of the adjoining towns. The diarrhoeal diseases were present during the hot months and tonsilitis has been during the last two months. Two nuisances were reported and the same were removed.

#### ALNA.

Members of the board: A. B. Erskine, one year; B. W. Donnell, two years, Chairman; A. M. Card, M. D., three years, Secretary and Health Officer.

The health conditions of the town are good. No cases of the contagious diseases have occurred, excepting one case of typhoid fever which ended in recovery. The condition of the schools is bad as regards all the particulars which you inquired about. The three nuisances which came to our notice were removed and the other work of the board has been promptly attended to.

#### ALTON.

Members of the board: Otis E. Gerry, one year, Chairman; Amasa Hatch, Jr., two years; A. H. Twitchell, M. D., three years, Secretary.

The water supply in one section of the town is from cisterns, while it is from springs and wells in another. Privies with leaking cess-pools are in use.

There has been but one case of scarlet fever, which recovered, but there have been four cases of typhoid fever one of which ended fatally. The bowel troubles and pneumonia are two classes of diseases which were more prevalent than usual. The former occurred

during the drouth when the wells and streams were low. Diphtheria and scarlet fever are diseases which were less prevalent than usual.

We have had no complaints of nuisances.

Two of our school-houses are too thoroughly ventilated. One might throw a cat through the wall almost anywhere without danger or injury to either the cat or the house.

Methods which I would suggest for improving the sanitary condition of the town would be a series of lectures on hygiene or it might be done by the circulation of printed matter showing the duty of every citizen in averting danger from disease and in securing the best chances for health.

#### AMHERST.

Members of the board: N. P. Sumner, two years, Chairman; W. L. Hussey, two years; Geo. A. Lord, M. D., three years. Secretary and Health Officer.

No cases of infectious diseases have occurred in the town. In November, eight or ten cases of so-called croup followed each other in rapid succession, and it is thought that these were caused by atmospheric changes.

#### ANDOVER.

Members of the board: C. A. Cushman; E. E. Bedell, Secretary; W. W. Barnes, M. D., Chairman and Health Officer.

No contagious diseases have occurred, and we have not had much work to do. Improvements might be made in regard to the privies and sink spouts.

#### ANSON.

Members of the board: Chas. A. Wilbur, one year; Ben Moore, two years, Chairman and Secretary; E. M. Wing, M. D., three years.

Our village water supply is very excellent, coming as the most of it does from living springs of pure water, and the farm houses in the town are also supplied from the springs. The village has sewers through the principal streets, some of brick and stone, some of cement pipe, and a few of timber and plank. Most of the private houses are drained into the sewers or the river.

One case only of diphtheria occurred. Four nuisances were reported, all of which were abated by the owners, when requested by the board, excepting one, which was removed at small expense to

the town. Although we have not had much work to do, we believe that the existence of an organized board of health has had a good effect, not only in the few cases brought to the attention of the board but also as a stimulus to the average citizen to be more carefull.

#### ARGYLE.

Members of the board: J. N. Tracy, one year, Secretary; S. L. Freese, two years; S. J. Bussell, three years, Chairman.

We have escaped with no contagious diseases, not even a fever.

#### ARROWSIC.

Members of the board: Jason McFadden, one year, Secretary; Wm. H. Spinney, two years, Chairman; Thos. J. Randen, three years.

There has been but little sickness of any kind, and we have been entirely exempt from contagious diseases.

#### ASHLAND.

Members of the board: J. M. Nowland, one year, Secretary; J. H. Carter, two years, Chairman; E. A. Duren, M. D., three years, Health Officer.

We have had but little sickness, excepting seven cases of typhoid fever, probably caused by bad drainage.

The school-houses are heated with stoves and are badly ventilated. The lighting is good; but the out houses are in a bad condition.

#### ATHENS.

Members of the board: L. N. Ellingwood, M. D.; M. L. Marr, M. D., Secretary; J. S. Tobey, M. D., Chairman.

No contagious diseases. Phthisis, simple fevers and chronic diseases have been more prevalent than usual, and we have an epidemic of measles at the present time (last of December.) Diphtheria, typhoid and scarlet fever have been less prevalent than usual. Much good could be done by the general enlightenment of the inhabitants in regard to water supply, drainage, and the disposal of excreta. Several cases of measles have come under my observation in persons who claim to have had this disease in previous years.

## ATKINSON.

Members of the board: W. S. Leason, one year; E. W. Trask, two years, Chairman; Geo. W. Harvey, three years, Secretary.

No report received.

## AUBURN.

Members of the board: Daniel Lara, one year; Henry Lowell, two years, Chairman; J. W. Beede, M. D., three years, Secretary and Health Officer.

The water supply is from Lake Auburn, formerly called Wilson's Pond. It has an area of about six square miles, averages 30 feet in depth, and is fed largely by springs beneath its bed. Its water is of unusual purity, cool and devoid of unpleasant taste.

Excreta are disposed of by removal with night-carts and by burial. A system of sewerage has been constructed in the city proper, which adequately fulfills its purpose, with the exception of two or three streets, where it is not low enough to drain the cellars.

Reckoning each house separately, fifty-five nuisances have been reported, of which thirty have been removed. Of the fifty-five reported, some were not strictly nuisances, although the conditions required a little more attention to render it less objectionable to neighbors. Others which need removal have been permitted to remain, on the promise of abatement as soon as the ground settles next spring.

Thirty-five cases of diphtheria, twenty-five of scarlet fever, and sixteen of typhoid fever have occurred. One death resulted from diphtheria, and one from scarlet fever.

The cases of typhoid fever have been, in proportion to population, far more numerous in the country districts, where bad drainage and neglected privies so generally exist. Where typhoid fever occurred in the city proper, we almost invariably found improperly constructed or uncared-for privies and foul drains.

In the houses where diphtheria occurred, the sanitary conditions were obviously bad; in two houses excusably so. Most of the houses infected with this disease had no connection with the public sewer.

The sanitary condition of our city would be improved by abolishing wells in the districts where the aqueduct system extends, by sewerage all our streets, by lowering such sewers as are too near the surface to receive the drainage from abutting premises, and by com-

pellung universal entrance into the sewers for the disposal of excreta and waste water, through properly constructed drains.

A case of fever of typhoid type and several cases of scarlet fever, one of which was the only fatal case which we had, and in which the patient died before the eruption appeared, were in a house near the outlet of a private sewer, through which had passed the contents of privies and the waste water from four houses. One very severe case of typhoid fever seemed to have no other origin than the sewer gas emanating from the man-hole from the corner of the street.

When contagious diseases have entered the schools, the school-houses and out-houses have been thoroughly washed and disinfected. We have thus dealt with one school-house twice.

Whenever we have heard of a nuisance or a case of contagious disease, one or more of us has given immediate attention. Infected persons have been isolated and the directions which are given in the preventive disease circular have been carefully carried out.

#### AUGUSTA.

Members of the board: H. A. Taber; R. B. Capen, C. E., Secretary; G. W. Martin, M. D., Chairman; H. L. Johnson, M. D., Health Officer. On account of the absence of Dr. Johnson, Dr. R. J. Martin was appointed November 1st, to fill the vacancy.

The principal water supply is that afforded by the Augusta Water Company, which furnishes Kennebec river water. Smaller supplies are the Devine system, and the Johnson, the latter of which furnishes spring water, supplemented by river water. All of these supplies are considered good.

Forty-four nuisances were reported to Dr. Johnson, and three in the fall to Dr. Martin. Contagious diseases were reported to the board as follows: Diphtheria, 46 cases, with four deaths; scarlet fever, 21 cases, with no deaths; typhoid fever, 23 cases, with one death. Typhoid fever and diphtheria have been more prevalent than usual, and pneumonia less prevalent. The cases of contagious diseases were isolated, the families furnished with instructions for disinfection, and teachers were notified of infected houses.

#### AVON.

Members of the board: Jonas Badge, Secretary; N. E. Gould; Joel Wilbur, Chairman.

There have been no cases of scarlet fever or typhoid fever, and but one case of diphtheria, which ended fatally.

## BAILEYVILLE.

Members of the board: Patrick Maloy, one year; J. G. Smith, two years, Chairman; J. D. Lawler, three years, Secretary and Health Officer.

The work of the board has occupied a part of two days, in looking after two cases of diphtheria, both of which were fatal. The disease was brought from St. Stephen, N. B.

## BALDWIN.

Members of the board: I. S. Chase, one year, Secretary; J. M. Sanborn, two years, Chairman; Lorenzo Norton, M. D., three years. No report received.

## BANGOR.

Members of the board: John Goldthwait, one year, Secretary; A. R. Tanny, M. D., two years; D. A. Robinson, M. D., three years, Chairman.

Water is supplied by the Holly system, the water being taken from the Penobscot River. Its quality is excellent. Excreta from those dwellings which are not connected with the sewers are removed to farms by night-carts. The sewer system provides for house and surface drainage combined, and discharges partly into the Penobscot river at extremely low water, and partly into the Kenduskeag stream. It is designed to have the outlet entirely into the river at low water, as soon as the construction can be completed.

One hundred nuisances have been reported all of which have been removed. Of contagious diseases, we have had ten cases of diphtheria, with five deaths; fourteen of scarlet fever in a light form, with no deaths; and twelve of typhoid fever, with three deaths.

Houses have been visited where contagious diseases have appeared, they have been placarded, the circular pertaining to the infectious disease present has been given to the inmates, and children from these infected houses have been excluded from the schools, until all danger of contagion has passed. School-houses generally are in good repair. The Holly water is in fifteen of the school-buildings, and thirteen of them have water closets. Since the organization of our board in April, we have met with success in carrying out our work, and have received encouragement from the people generally.

## BARING.

Members of the board: Jas. W. Bailey, one year; Cyrus Chase, Secretary, two years; Jas. D. Woodcock, three years, Chairman.

No cases of diphtheria, scarlet fever, or typhoid fever have occurred in town. Two new cases only have come under our observation, and both were removed. The condition of the school-houses is very good, but that of the outhouses is not satisfactory.

## BATH.

Members of the board: J. M. Clark, one year; A. J. Fuller, M. D., two years, Chairman; E. E. Briry, M. D., three years, Secretary.

The number of the regular meetings of the board has been seven, and the number of informal meetings on the street almost infinite. The water supply is from wells, springs, cisterns, and the recently introduced "city water." The latter supply is brought through six miles of pipe from Thompson's brook, a small stream that has its source in numerous springs, which bubble up through the sands of Brunswick Plains. It is now used by more than five hundred families and is giving great satisfaction. Prof. Robinson has examined several samples of this brook water, and found them all to be of an unusually pure character.

The contents of the vaults which are not connected with the sewers are removed to the adjacent farming land. Rule 4 of our health rules and regulations requires that "all privy vaults and cess-pools shall be cleaned out twice a year: in the early spring and again late in the autumn."

The drainage of our city is for the greater part superficial, and the property of private parties. A system of sewerage has no existence in Bath.

The nuisances with which the board has had to deal have been privy vaults neglected for many years, obstructed and leaky drains, filthy yards and cellars, cess-pools, stagnant waters, exposed manure, etc., etc. Some four hundred nuisances have been reported to the board. All have been examined, removed or improved upon. The neglected privy vaults of tenement houses gave considerable trouble early in the year. The delay was due to a difference of opinion between tenant and owner as to whose duty it was to attend to the matter.



Eleven cases of diphtheria, with two deaths, one case of scarlet fever, ending in recovery, and three cases of typhoid fever, with one death, occurred in our city. As soon as cases of the contagious diseases have been reported to our board our health officer, the city marshal, immediately visits the house, placards it in the most conspicuous place with one of our bright red placards, notifies the family to remain isolated and away from their neighbors and friends, and to forbid their friends visiting them, until such time as the attending physician may specify. In our present city marshal we have a very faithful and efficient officer.

In regard to the communication of diseases by contagion, we can say that in no case was a disease allowed to attack persons outside of the house which was quarantined. In one case, two of a family were taken sick with diphtheria one after another; in another family, three were taken sick with diphtheria, with intervals of five days between the cases.

There are two districts of our city, which, no doubt, are the cause of much sickness. The first is built upon made land, with a low grade, and faces numerous docks and flats, whose surfaces are exposed at every ebb tide. These docks and flats are frequently in a very filthy and unhealthy state, on account of the sewage which is discharged into them, and also because they are made places for all sorts of refuse and waste. The other district is our so-called French Hill, quite a settlement of small, low houses, built upon a plateau so rocky that drainage is beyond their means, even if they ever thought of such a thing as keeping their houses and premises clean and neat.

What we need most for improving the sanitary condition of our city is a system of sewerage. We have felt the need of it in the past, and we feel the need of it much more now. It has cost some \$150,000 to bring water into our city, and it will cost at least as much more to get this water away again.

During the month of May, a systematic inspection was made of the streets, alleys, yards and tenement houses throughout the city, and the board discovered a wide field for work. Our board has been kept very busy investigating the numerous complaints which have been made at the office, and to have attended to them all at once would have required our undivided time.

That every family in the city might become familiar with certain sanitary laws, and not have for an excuse the lack of information of the subject, our board prepared a series of health rules and reg-

ulations, based upon the laws of the State and the city ordinances, and had a printed copy of them placed in every household. Copies were also posted in conspicuous places, and a notice inserted for one month in our Bath daily paper. The ordinance forbidding the throwing and sweeping of paper and other rubbish from the stores into the street has been enforced, and our streets, therefore, present a much more cleanly appearance. Our board has reason to think that, during the short time that it has been in existence, it has done considerable to improve the sanitary condition.

#### BEDDINGTON.

Members of the board: Eli Oakes; F. B. Oakes, Chairman; Chas. B. Farnsworth, Secretary.

No report received.

#### BELFAST.

Members of the board: H. P. Thompson, Chairman; L. T. Shales, Secretary; A. C. Ellingwood, M. D.

The new water supply for the city from Little River was introduced the first of December, and we now have a nice system of water works. This stream rises from what is called Shaw's Springs, and the water is said to be very pure.

We have no regular system of sewerage. Six nuisances were reported, and all were abated. One case of typhoid fever was reported. The city has been very fortunate in regard to contagious diseases throughout the year.

#### BELGRADE.

Members of the board: Greenlief Hersom, one year; L. W. Bachelder, two years, Chairman; L. E. Reynolds, M. D., three years, Secretary.

In the village at the depot, water is obtained from wells which seem to be fed by deep, underground streams of good, hard water from the neighboring hill. No provision has been made to prevent wells from receiving surface drainage from barns, stables and water-closets. The same may be said of wells in all parts of the town. In some cases, they are situated within a few feet of stables or barns or privies; in other cases, at a distance from these out-buildings, their location depending wholly upon chance or convenience.

We have had an unusually healthy year and very little work has been done by the board. No complaints were made concerning nui-

sances and no contagious diseases were present, except three cases of typhoid fever. In these cases we ordered the excreta disinfected and buried at a distance from all dwellings and wells, and patients' clothing in all the cases was disinfected by thorough boiling.

#### BELMONT.

Members of the board: N. B. Allenwood, Chairman; O. C. Cammett, Secretary; D. A. Green.

We have had no cases of the infectious diseases, thus, fortunately, we have had nothing to do.

#### BENEDICTA.

Members of the board: Jeremiah Perry, one year, Health Officer; Edward Qualey, two years, Chairman; John B. Doyle, three years, Secretary.

No cases of contagious diseases have occurred in the town.

#### BENTON.

Members of the board: A. H. Richardson, one year, Chairman; Augustine Crosby, two years, Secretary; J. W. Sylvester, three years.

No report received.

#### BERWICK.

J. H. Stillings, one year, Chairman; C. M. Guptill, two years; H. V. Noyes, M. D., three years, Secretary.

The water supply of the town is wholly from wells and springs and is generally good. Two nuisances only were reported and these were abated.

We had four cases of typhoid fever, one of which resulted fatally. Measles have been very prevalent; probably two hundred and fifty cases in a village population of about fifteen hundred. There has been an unusual number of cases among adults. In the cases of the infectious diseases we practice isolation and disinfection. One of our school buildings is heated by steam; the others are heated by wood stoves. The ventilation is good in some of them, but in several of the rooms which seat from forty to seventy pupils the ventilation is bad. The work done by the board has consisted mostly in securing improvements as regards privies and sink drains.

#### BETHEL.

E. B. Goddard, Chairman; J. A. Twaddle, M. D., Secretary; A. B. Godovin.

We have had no epidemics ; no cases of diphtheria, none of scarlet fever, but we have had six cases of typhoid fever. More care of the privies and the avoidance of the draining of them into the wells would improve our sanitary conditions.

#### BIDDEFORD.

Members of the board : C. J. Emery, M. D., one year, Chairman ; J. H. Stone, two years ; Daniel Cote, three years, Secretary.

About half of the city is supplied with water from the works which take their water from the Saco river about two miles above here. The water is considered good. The rest of the city is supplied from wells as the water pipes have not yet been laid in all the streets.

Water-closets are used in the houses on the principal streets where the sewers will accommodate them ; the old-fashioned night-cart is brought into use for the remainder. About half our streets have sewers, but the most of them are of very inferior kind, having been put in by successive administrations.

Marked improvements have been made during the past two years. Three hundred and twenty-seven nuisances have been reported and all have been abated with a few trivial exceptions.

About half the physicians report their cases of contagious diseases. The number of cases given of the contagious diseases is only approximative. Thirty-four deaths have occurred from diphtheria and the whole number of cases must have been more than twice this number. About seventy-five cases of scarlet fever, mostly of a mild form, with seven deaths and about twenty-five cases of typhoid fever, with four deaths. Typhoid fever has been less prevalent than usual due to an abundant supply of pure water, and in part, undoubtedly to the efforts of the board of health.

Houses have been visited where cases of the infectious diseases have been reported and the family has been isolated as much as possible and the children have not been permitted to return to school without the certificate of the board or their *regular* medical attendant. The greatest want of the city to improve its sanitary condition is proper drainage.

Quite a number of drowning accidents have occurred the past season, and three kerosene accidents have occurred, in one of which the burning was fatal. Dr. Emery of this board reports a case which occurred in the adjoining town of Kennebunk where the mother ap-

plied kerosene externally to the throat of her six-year-old daughter who was suffering with scarlet fever, and the tissues were destroyed to such an extent as to produce death in ten or twelve days. There have been at least half a dozen deaths from diphtheria which were undoubtedly caused by gas from cesspools.

#### BINGHAM.

Members of the board: J. D. Merrill, one year, Chairman; Z. F. Houghton, two years, Secretary; A. A. Piper, M. D., three years, Health Officer.

The village is supplied with water by an aqueduct, but on the farms water is usually obtained from wells. No cases of the infectious diseases have been reported to this board. The school-houses are not in good condition.

#### BLAINE.

Members of the board: Jonathan Hersom, one year; Almon O. Nutter, two years, Secretary; John M. Ramsey, three years, Chairman.

But one nuisance was reported to the board and this was abated. Earth closets have often been cleaned and disinfected at the request of the board.

There have been three cases of diphtheria, thirteen of scarlet fever and twelve of typhoid fever in the town. When cases of the infectious diseases have come to our knowledge we have attended to them at once and given instructions necessary for the prevention of their spreading. Back of our village there was a basin which had not been drained until the past year when it was done under the direction of the board.

As a rule the school-houses are in good condition. Scholars from houses where there are contagious diseases have been excluded from the schools as soon as the fact of contagion was known, in accordance with the instructions from the State Board.

#### BLANCHARD.

Members of the board: E. P. Blanchard, Secretary; Chas. B. Packard, Chairman; Willis H. Knapp.

Three cases of diphtheria and one of typhoid fever have occurred. The water supply is very good with a few exceptions where some wells are within fifty or seventy-five feet of sink spouts or privies.

## BLUEHILL.

Members of the board: G. G. Long, one year; A. C. Osgood, two years, Chairman; R. P. Grindle, M. D., three years, Secretary.

The water derived from wells is good, but hard. Privies are in use but in many of them the excreta is removed several times yearly and dry earth is added daily. Two nuisances have been reported and both were removed.

Two cases of diphtheria have occurred with one death and there have been three cases of typhoid fever with one death. Measles was unusually prevalent and the prevalence was due to a few people taking special pains to spread the disease instead of using means to prevent it. Diphtheria, typhoid fever and scarlet fever have been less prevalent than usual. Prompt action has been taken when we have known of cases of the infectious diseases to prevent their spreading. Generally speaking the condition of the school-houses is bad. No contagious diseases have entered the schools. The condition of a certain locality in East Bluehill is not healthful, and better drainage would improve the sanitary condition of that place as well as that of the village.

## BOOTHBAY.

Members of the board: J. R. McDougal, one year; N. S. Baker, two years, Chairman; Alden Blossom, M. D., three years, Secretary.

Four nuisances were reported to the board and these were removed. There have been eight cases of diphtheria with two deaths, one case of scarlet fever which recovered and fourteen cases of typhoid fever with only one death. Measles and mumps have been unusually prevalent, while cholera infantum and other bowel complaints were not so common as usual. When the infectious diseases have occurred the houses have been placarded and the premises have been isolated.

In the single case of scarlet fever the mother had been in Boston on a visit and while there the doctors said she had scarlatina and they pretended to disinfect her and her effects. She arrived home Wednesday evening and on Saturday morning following I was called and found her little daughter, eight years old, suffering from scarlet fever.

## BOWDOIN.

Members of the board : Daniel A. Coombs, one year, Secretary ; Frank S. Adams, two years ; Thos. W. Skelton, three years, Chairman.

No contagious diseases have occurred excepting four cases of typhoid fever. The patients all recovered. In three of the cases the fever was taken out of the town and in two of the cases it was contracted while nursing fever patients. In these cases we provided the households with circulars giving instructions in regard to the prevention of the fever.

## BOWDOINHAM.

A. H. Cheney, M. D., Chairman ; I. C. Irish, M. D., Secretary ; L. D. Small.

We have had in town five or six cases of diphtheria with two deaths, one case of scarlet fever ending in recovery, and two cases of typhoid fever, both recovering. Follicular tonsillitis, bronchitis, and influenza were more prevalent than usual and typhoid fever and pneumonia were less prevalent than they sometimes are.

Half a dozen cases of nuisance have been reported to the board and all have been removed save one which is occasioned by an obstruction of one of the main village drains by the Maine Central Railroad. Before the road was built there was a good drain and for several years after, for the road built a drain under its track, but one time when putting in a side track they filled up the drain. It is the worst kind of a nuisance causing the cellars of houses in the vicinity to be wet and making the soil damp at all seasons of the year in that part of the village.

Suggestions which I should make for improving the sanitary condition of the village would be the more frequent removal of excreta and greater care about well water and in regard to the condition of cellars. The water is mostly from surface wells, and the clay soil is so deep that many of the wells do not go through the clay.

The school-house in the village, I think, is an example where unhealthy conditions exist from the proximity of the outbuildings to the school house. Scarlet fever entered the grammar school in the village. The school was closed, the house disinfected by burning sulphur in the room, and the pupils quarantined.

## BRADFORD.

Members of the board: E. F. Mitchell, one year, Secretary; L. S. Bickmore, two years; H. D. Worth, M. D., three years, Chairman.

One nuisance only in the shape of a slaughter house was reported to this board and that was removed. There have been no cases of contagious diseases. The condition of the school-houses appears to be good.

## BRADLEY.

F. C. Barton, one year; Eugene Lenfest, two years; A. E. Perkins, three years, Secretary and Chairman.

Only one nuisance has been reported to the board and that was removed. It has been a general time of health. There have been no cases of contagious diseases. In all of the seven deaths in the town four were of consumption, two of old age, and one of paralysis. A new school building costing four thousand dollars has been erected in the village.

Our village is a healthy place, the water supply is abundant and good, and almost every one is temperate. There is no rum shop in town nor has there been for twenty years, and we do not intend to have one for twenty years to come.

## BREMEN.

Members of the board: S. Genthner, one year; Warren Webster, two years, Chairman; C. B. Palmer, three years, Secretary.

But one nuisance was reported to the board. One case of scarlet fever and four cases of typhoid fever have occurred. Our school-houses are in good condition. They are all heated with wood stoves and the only trouble is in their not being ventilated. The houses are tight and when they become over heated the teachers open the windows and let the wind blow on the scholars. One man lost three cattle last spring and hauled the bodies on to the pond. We were notified of the fact and ordered them buried.

## BREWER.

Members of the board: I. Getchell, M. D., one year; F. A. Connor, Esq., two years, Secretary; C. P. Thomas, M. D., three years, Chairman.



The water supply of this village is anything but good. Two-thirds comes from wells that must of necessity be foul, as they are situated too near sinks and privies without cess-pools or vaults excepting the hole in the ground. In many instances these vaults are within twenty-five or fifty feet of the well. This year I have had all the excreta carted out of the village to be applied to farms, and the other garbage has been carted away and used as filling.

The house drainage of this village is poor and the most of it has gone into holes dug on the house lots into which a cask has been sunk. The sewerage is good as far as it goes, but we have not one-tenth part enough. Last year we raised two thousand dollars for sewers. Five hundred of this was well expended and the remaining fifteen hundred was the same as thrown away.

Five or six nuisances have been reported to the board. They all consisted of sink drainage which was disposed of in a way to be offensive to the neighbors. All these cases I have been able to remedy wholly or in part.

The whole number of deaths in the town is twenty-eight; of these, two resulted from measles and two from typhoid fever. Two other cases of typhoid fever ended in recovery.

Typhoid fever and diphtheria have been much less prevalent than usual and I am convinced that the cleaning up and keeping clean has had much to do in making the change. In connection with the cases of typhoid fever which occurred we had as little intercourse as possible between the sick and others, and had disinfection carried out.

Three of our school houses are good buildings, one particularly, just completed is as nice a building as there is in the county. Some of the other school-houses, on account of bad water and poor ventilation and mean privies are a disgrace to any community. The suggestions which I would make for improving our sanitary conditions would be the extension of our sewerage system, a more general use of the Holly water, and the closing up of most of the wells now in use.

A case of scarlet fever came under my observation some years ago in an old house which was soon after deserted by the family and not re-occupied as a dwelling place. The doors and windows were taken out and carried away and the old shell stood for two years with the weather blowing through it. The old house was then sold to a friend of mine and he with his son tore it down and hauled it home. Six days after they were engaged in this work, the son took

scarlet fever and it was a bad case. This case was in the open country and the boy had been nowhere to be exposed to the disease and there was not a case within thirty miles that we could learn of, and I took great pains to inquire.

As secretary and executive officer I was instructed by the board to make a sanitary inspection of every street and all the premises in regard to the conditions of the sink-drainage, cess-pools, privy-vaults, and I may say that it was astonishing what such an inspection will disclose. It seemed no wonder that we had had typhoid fever, diphtheria and similar diseases. The house lots are small, many of them are 50x50 feet or 50x100 feet, all containing sink spouts and privies saturating the ground and poisoning the air, the earth and the water more and more every year. In this work of making improvements I met with good success; the people readily took hold of the work and were glad of my assistance and advice.

#### BRIDGEWATER.

Members of the board: T. G. Durgin, one year, Chairman; E. O. Collins, two years; R. H. Perkins, three years, Secretary.

Most of the water supply is from wells, the water is hard from lime, but is generally good excepting in the cases where the wells are badly located.

Two nuisances have been reported to us. In the one case complaint was made of the tannery and on examination we concluded they were doing as well as they could to keep the premises in a healthful condition. The refuse matter from the hides was hauled off each day and buried, and the liquid matter was turned into the stream. In the other case a cow which was left unburied near a neighbor's house was a nuisance, and we had it removed and properly disposed of.

There have been ten cases of diphtheria with two deaths, four cases of scarlet fever and one of typhoid fever. Our physician says there has been a smaller number of cases of the contagious diseases this year, also that it has been generally healthy.

The school-houses generally are badly heated and badly ventilated. The school-house at Bridgewater Corner we consider to be in the most unhealthy condition of any in town from the fact that the privies were under the same roof with the school and in very warm days it was almost impossible to occupy the house.

## BRIDGTON.

Members of the board: G. G. Wight, Chairman; F. A. Mitchell, M. D., Secretary; John Hamlin.

We have no system of water works and the drinking water is obtained mostly from wells. A part of the village is supplied by an aqueduct which takes water from an elevation west of the village. Five nuisances were reported and four of these were abated.

Five cases of diphtheria with four deaths, and two cases of typhoid fever with one death, have occurred. Measles has been prevalent. The use of better drinking water, or water not taken from wells adjacent to buildings, and better drainage, would make an improvement in our sanitary condition.

## BRIGHTON.

Members of the board: L. H. Hayden, one year, Chairman; L. C. Forbes, two years; Peter Walker, three years, Secretary.

No nuisances have been reported to the board and there have been no cases of infectious diseases.

## BRISTOL.

Members of the board: S. N. Smith, Secretary; N. J. Hanna, Chairman; Samuel W. Johnson, M. D., three years.

No nuisances have been reported to the board. One case of typhoid fever occurred; the patient recovered. No disease has been unusually prevalent during the year. One accident occurred from drowning.

## BROOKLIN.

Members of the board: Newall Powers, one year, Chairman; F. S. Herrick, M. D., two years; E. P. Cole, three years, Secretary.

Three cases of typhoid fever and several cases of measles occurred in the town during the year but no deaths occurred. There has not been an unusual prevalence of any particular disease. Pneumonia has not been so prevalent as it has some years. Two of the schools were closed for a few weeks for fear of the measles when in the vicinity. In view of the healthy condition of the town we have not felt called upon for any special action, but were ready for it if the occasion required it.

## BROOKS.

Members of the board: T. A. Elliot, one year, Secretary; Jos. Ellis, two years, Chairman; A. E. Kilgore, M. D., three years, Health Officer.

No report received.

## BROOKSVILLE.

Members of the board: Lewis Robinson, M. D., one year, Secretary; Jere. Jones, two years; E. C. Chatto, Esq., three years, Chairman.

The town has been remarkably healthy for the past year. We have, however, had four cases of diphtheria but no deaths from this disease, and there have been two cases of typhoid fever with one death. In dealing with cases of contagious diseases the law has been carried out in spirit, if not exactly to the letter, and with good success. The first case of diphtheria was brought here from Boston. The cases were all mild. The first case of typhoid fever was imported from Bangor. The best recommendation I could make for improving the town is sanitary instruction.

## BROWNFIELD.

Members of the board: A. F. Perkins, Secretary; Hiram Gatchall; S. B. Bean, Chairman.

Six cases of typhoid fever occurred in the town with two deaths. No diseases have been unusually prevalent, but diphtheria and scarlet fever are notable for their absence. For unhealthy localities within the town might be mentioned some of the low marshy land where there is more or less stagnant water along the Shepherds river.

In a thinly settled place like this there is not much work to do, but it is just as necessary to have what there is done well as it is in larger places. (The truth which the Secretary expressed in this last sentence and the wisdom of having a local board in even the smaller towns was shown a little later and before this goes to press by the outbreak of small-pox in Brownfield which the local board have so far restricted to a single family. Secretary of State Board.)

## BROWNVILLE.

Members of the board: E. S. Hamlin, one year; T. W. Pratt, two years, Chairman; T. W. Billings, three years, Secretary.

No report received.

## BRUNSWICK.

Members of the board: M. V. Adams, M. D., Secretary; Franklin Adams, Chairman; Sam'l Whitmore.

The public water supply is taken from the Androscoggin river about one mile above the dam in this village. I sent a sample of water to your board for analysis and while it might not be called free from objections it proved to be better than most of the well water of the village.

We have no system of sewerage. A few houses have cess-pools. Some of these are regularly cleaned out, while others are left to overflow. The most of the drainage, however, is on the surface of the ground.

During the summer the board was often called upon to investigate the alleged unhealthful condition of cess-pools and privy vaults, and in most instances they were put in a neat and less objectionable condition by the owners upon notification. We had trouble with but one of these owners and after repeated notices and delay we were obliged to enter action against him and it cost him forty dollars. This person has always been negligent in these matters. There is more sickness in that part of the town occupied by the French population than in any other. A system of sewerage is the great want of the town.

Typhoid fever was unusually prevalent during the winter of 1887. I could discover no special reason why it existed as the cases were scattered in various sections of the village and some occurred outside. I can report only the number of contagious diseases which have occurred in my own practice which is as follows: typhoid fever, 51 cases with seven deaths, diphtheria, 8 cases with two deaths.

## BUCKFIELD.

Members of the board: H. D. Irish, one year; J. F. DeCoster, M. D., two years, Secretary and Health Officer; J. C. Caldwell, M. D., three years, Chairman.

No cases of the infectious diseases in town. It has been unusually healthy. The sanitary condition of the town is our good. The school-houses in the smaller districts are in a rickety and tumble down condition.

## BUCKSPORT.

Members of the board: G. W. McAllister, one year, Chairman; John Tillock, two years; G. H. Emerson, M. D., three years, Secretary and Health Officer.

The water supply is principally from wells and cisterns. The large part of the village is sewerred. One nuisance only—sink drainage which emptied into the street—was reported to the board. It was abated by having the drain connect with the sewer. No disease has been especially prevalent. An abundant water supply would effect a sanitary improvement.

There having been nothing urgent this board has not done much to report. It has however been observant and has made many suggestions for promoting the sanitary conditions of individuals and the town which have been acted upon.

#### BURNHAM.

Members of the board: John Cook, one year; Geo. E. Berry, two years, Chairman; A. W. Fletcher, three years, Secretary.

No report received.

#### BURLINGTON.

Members of the board: Geo. W. Lord, one year; J. W. Bradbury, two years, Secretary and Health Officer; G. M. Page, three years Chairman.

Our town is small and we are supplied with an abundance of good spring water and pure air. We have had no nuisances reported to us, nor contagious diseases excepting measles, and, as it is warm weather, no effort was made to check it; consequently it made very thorough work through the town. Only the older ones were seriously sick. The school-houses are heated with stoves and the most of the trouble comes from overheating and then sudden cooling which brings on colds and coughs.

#### BUXTON.

Members of the board: E. C. Carroll, one year; J. F. Warren, two years, Chairman; F. A. Southwick, M. D., three years, Secretary.

Two minor nuisances were reported to the board and were removed. Three cases of typhoid fever have occurred with one death. As a rule our school-houses are badly ventilated and wrongly lighted.

The greatest need of the town is a re-arrangement of the water supply, outhouses and sink drainage. I do not think the people realize the danger from these sources and they should be instructed either by lectures or well written arguments in the form of circulars.

## BYRON.

Members of the board: John E. Shaw, one year, Chairman; John Houghton, two years, Secretary; H. H. Richards, three years.

At about every farm house an artesian well supplies very good and pure drinking water. Besides these, Swift River runs the entire length of the town and it is fed by smaller streams of pure water which rise in the mountains. Five cases of diphtheria have occurred with one death. There have also been five cases of croup all of which have ended fatally. Action is taken to prevent the spread of contagious diseases when cases are reported to this board; houses have been placarded and the families have been instructed in regard to the cleansing of the rooms.

## CALAIS.

Members of the board: D. E. Seymour, M. D., one year, Secretary; E. H. Vose, M. D., two years; Cornelius Ellis, three years, Chairman.

Our public water supply is taken from the St. Croix River about a mile and one half above the head of navigation, and the water is believed to be good. Excreta and garbage are generally removed in the night to farms adjacent to the city to be used for fertilizing purposes; previous to removal however care is taken that disinfectants are thoroughly incorporated, sulphate of iron or chloride of lime in solution being used. The old style "hole in the ground" privy with the vault and cess-pool are among the things of the past. The drainage is not absolutely perfect though much attention is given to it by the authorities, and as rapidly as the finances permit. But two nuisances were reported and these were promptly suppressed.

Four cases of diphtheria and the same number of typhoid fever, and there was one death from the latter disease. There have been no cases of scarlet fever. Prompt attention has been given to every reported case of the contagious diseases and strict measures have been instituted and carried out for their suppression. By so doing the disease has been limited to a single case in the family where it appeared, and its spread has been prevented by quarantining the premises until disinfection was done and all danger was passed. Regarding these matters, pains have been taken to point out the places where danger lurks and to show that prevention is better than cure.

The causes of three of the cases of diphtheria were quite obscure. In one case the disease was imported from Augusta and was traceable to imperfect cellar drainage, this child being a visitor in the house where sore throat had existed. The child became sick on its way home so the mother says.

From a sanitary point of view I am happy to report that our city is in a favorable condition, and I think that it would bear a rigid inspection and a comparison with any other city or place.

#### CAMBRIDGE.

Members of the board: S. A. D. Bailey, one year, Secretary; Elisha Knowles, two years; J. W. Cole, three years, Chairman.

No report received.

#### CAMDEN.

Members of the board: Albert Leach, one year; P. B. Cooper, two years, Chairman; O. W. Stone, M. D., three years, Secretary and Health Officer.

The water supply of this place is as good as that of any in the State. Its source is Mirror lake five miles away. The lake is fed by springs and has no inlet. We have no public sewers; the drainage is mostly into cess-pools. There have been twelve complaints of nuisances all of which have been removed. The one which gave the most trouble to secure its removal was a large slaughter house beneath which swine were kept and all the offal was thrown to them. It became a very offensive and unsanitary nuisance. Generally the citizens very readily complied with the wishes of the board.

We have had no cases of diphtheria. There were seven cases of scarlet fever all of which recovered, and only two cases of typhoid fever have been reported. No other disease has been unusually prevalent. The seven cases of scarlet fever all occurred in one family. One of these children returned home from Boston during the illness of the others and was taken with the fever thirty-six hours after its arrival.

Fortunately the work of our board has not had to be very extensive. We are fortunately quite free from a great amount of extreme poverty which is usually productive of filth and unhealthy locations. Perhaps the thing we deserve the most credit for is the prevention of the spread of scarlet fever from the one house where we had seven cases; we do claim a little credit for that.



## CANAAN.

Members of the board: L. G. Lord, one year; David Nason, two years, Chairman; L. W. Shean, M. D., three years, Secretary.

One nuisance was reported to the board and this was removed without trouble. Four cases of typhoid fever occurred with one death. Two of the cases of typhoid originated outside of the town, measles have been more prevalent than usual and diphtheria less so.

## CAPE ELIZABETH.

Members of the board: T. B. Haskell, one year, Secretary; J. W. Lowell, M. D., two years; S. B. Thombs, M. D., three years, Chairman.

Eight cases of nuisances were reported to the board and on notice from the secretary they were removed.

We have had two cases of scarlet fever and four of diphtheria with two deaths. Upon notification of a case of an infectious disease the house has been placarded, the family have been advised not to go abroad nor to permit visits to their house, and instructions have been given in regard to the proper methods of disinfection.

## CARIBOU.

Members of the board: Rev. C. E. Young, one year, Chairman; C. B. Roberts, two years; J. Cary, M. D., three years, Secretary.

Nine nuisances have been reported to the board and these were all removed or discontinued. They consisted of foul surface, slaughter houses and improper dumpings.

There have been five cases of diphtheria with one death, two cases of typhoid fever with no deaths and no cases of scarlet fever. The measures taken to restrict the contagious diseases have been the placarding of infected houses or premises, a notice to the attendants as to the proper care against exposing others, the proper supervision of funerals, visitation by the board to the premises when needed, and removal of the causes of the diseases if possible.

The sanitary condition of the village has become satisfactory under present circumstances and more care has been taken than previously to prevent the spread of contagious diseases and besides, knowledge is better diffused upon sanitary subjects in general. The outlook for the future is every way more promising.

## CARMEL.

Members of the board: Henry Kimball, one year, Chairman; W. A. Wan, two years; F. A. Simpson, three years, Secretary.

Since the appointment of the board no cases of contagious diseases have occurred. Before the appointment of the board there occurred in the early part of the year eight cases of diphtheria with three deaths.

## CARROLL.

Members of the board: C. Lane, one year, Chairman; O. Cushman, two years; H. A. Larrabee, three years, Secretary.

No report received.

## CARTHAGE.

Members of the board: J. S. Swett, one year; S. C. Morse, two years, Secretary; W. W. Goodwin, three years, Chairman.

Two cases of diphtheria occurred and both patients died. There has been one case of typhoid fever which ended in recovery. Our town has been unusually free from sickness the past year, but sore throat prevailed to quite an extent and the two cases of malignant diphtheria occurred. When cases of infectious diseases have occurred we have distributed the circulars and documents furnished us by the State Board, closed the schools in the neighborhood and advised the people in regard to the necessary precautions. At the time of the outbreak of diphtheria the Secretary of the State Board was called to Berry's Mills and through his advice and instructions in regard to disinfecting and other work we were fortunate enough to prevent the spread of the disease beyond the two cases which had occurred.

## CASCO.

Members of the board: L. B. Harman, Esq., one year, Chairman; L. W. Holden, two years; A. N. Witham, M. D., three years, Secretary.

One case of diphtheria and two of typhoid fever were reported to the board. Some of the school-houses are very badly arranged in regard to heating, ventilation, lighting, etc. There has been but little sickness and consequently the board has done but little, but it is ready to do when occasion calls.

## CASTINE.

Members of the board : I. L. Sheperd, one year, Chairman ; S. W. Webster, two years ; G. A. Wheeler, M. D., three years, Secretary.

The water supply is principally from wells. The water from many of the wells is bad and in nearly all is so hard as to make it unsuitable for drinking. There is also a spring in the north part of the village and one in the south-west part from which pure water is obtained.

One case of diphtheria occurred during the year and one case of typhoid fever. The case of the latter disease terminated fatally. It has been a very healthy year with the exception of perhaps a little unusual prevalence of diarrhoeal troubles and rheumatism. Ten complaints of nuisances were received and they were all removed. Our school rooms are generally in a good condition excepting the lateral lighting falls on the faces of the pupils more than on the books. Ocular troubles are I think on the increase among the pupils. We ought to have sewers and a better water supply. The coming season we hope to have a house inspection.

## CHARLESTON.

Members of the board : G. D. Cook, M. D., Secretary ; O. L. Smith ; W. E. Dunning, Chairman.

We have had no cases of contagious diseases save an unusual prevalence of erysipelas during the fall and winter. Our school-houses are in a fairly good condition.

## CHARLOTTE.

Members of the board : Leonard Fisher ; Daniel Fisher, Secretary ; Enoch Fisher, Chairman.

There have been three cases of diphtheria and two cases of diphtheretic sore throat. But no deaths resulted from the cases. The school-houses are ventilated only by opening windows.

## CHIESEA.

Members of the board : A. N. Douglass, one year, Secretary ; W. T. Searls, two years, Health Officer ; A. A. Sampson, three years, Chairman.

No cases of contagious diseases have appeared. Those people who live near the stream through which the military asylum disposes

of its excreta complain that the water is rendered unfit for use either for man or beast.

#### CENTERVILLE.

Members of the board: J. H. Floyd, three years, Secretary; B. L. Drisko, two years, Chairman; H. W. Foster, one year.

There have been no cases of diphtheria or typhoid fever or scarlet fever. The health of the town has been good.

#### CERRYFIELD.

Members of the board: Daniel Willey, one year; Samuel Ray, two years, Chairman; C. J. Milliken, M. D., three years, Secretary.

One nuisance was reported and one was removed. There has been but very little sickness through the year. But one case of typhoid fever occurred and no cases of diphtheria or scarlet fever.

#### CHESTER.

Members of the board: A. B. Brown, one year, Chairman and Health Officer; M. H. Haynes, two years, Secretary; E. L. Keen, three years.

There have been no cases of infectious diseases in town.

#### CHESTERVILLE.

Members of the board: B. F. Makepeace, one year, Secretary; T. J. Clough, two years; E. A. Hall, three years, Chairman.

No cases of the contagious diseases of a dangerous character have been present. In a few cases the matter of local house drainage and the disposal of it have been attended to.

#### CHINA.

Members of the board: W. W. Washburn, one year, Chairman; F. O. Brainerd, two years; J. G. Nelson, M. D., three years, Secretary.

The water is principally from wells and springs, and in the location of the former our citizens make it a question of convenience rather than of health. A large percentage of our farmers, even of the better class, have their wells less than one hundred feet from their barnyard and often within ten or fifteen feet of it. From these wells usually both the farmer's family and his stock are supplied. Two cases of nuisance and these were both removed. No

cases of diphtheria or scarlet fever have occurred, but there were two cases of typhoid fever with a fatal termination of one case. During the autumn of '86 and the following winter there occurred an epidemic of jaundice in the immediate vicinity of Week's Mills. Children only were attacked. Of these there were ten or twelve cases in my practice, all recovering. The disease appeared to me to be contagious.

In connection with the cases of typhoid fever the premises were visited and the water supply inspected and instructions were given in regard to disinfecting the discharges and the subsequent disposal of them. A fatal case of burning from kerosene oil I believe occurred in the practice of Dr. D. A. Ridley. One case of phosphorus poisoning and two cases of trichinosis occurred in my practice in the town of Windsor.

#### CLINTON.

Members of the board: Royal Wells, one year; C. M. Brock, M. D., two years, Secretary and Health Officer; Nathaniel Jaquith, three years, Chairman.

One case of scarlet fever and one of typhoid fever have occurred. The case of scarlet fever occurred in connection with the village school and the school was closed.

#### COLUMBIA.

Members of the board: Herschal Allen, one year; A. H. Leighton, two years, Chairman; J. E. Stewart, three years, Secretary and Health Officer.

No cases of the contagious diseases have been present.

#### COLUMBIA FALLS.

Members of the board: J. F. Pineo, one year, Chairman; E. F. Allen, two years; C. C. Bucknam, three years, Secretary.

We have had no cases of any of the contagious diseases. September 3rd, there was a case of cholera in a child three years old which was sick only eight or ten hours. It was buried the next day without a public funeral. (A case of cholera morbus probably.--SEC.)

No nuisances of any great importance have come to our notice and nearly all have been removed when the parties have been reminded of them.

## CONCORD.

Members of the board: C. R. Ellis, one year, Chairman; B. F. Atwood, two years, Secretary; Amen Savage, three years.

No cases of nuisances or contagious diseases have been reported excepting measles has been prevalent.

## COOPER.

Members of the board: Wm. W. Saddler, one year; Denison W. Palmetter, two years, Secretary; David Howe, three years, Chairman.

There have been no cases of contagious diseases.

## CORINNA.

Members of the board: J. C. Pease, Esq., one year; O. H. Merrill, M. D., two years, Secretary; Edwin Folsom, three years, Chairman.

Two cases of nuisance have been reported both of which were removed. No cases of diphtheria or scarlet fever have been present and there have been but two cases of typhoid fever, both of which recovered. The two cases of typhoid fever were, in my opinion, caused by the patients' visiting Stetson and drinking the water there, where, as I have already reported, there was a typhoid fever nest.

## CORINTH.

Members of the board: J. D. Cochran, M. D., one year, Chairman; E. H. Stanhope, M. D., two years, Secretary; C. H. Philbrick, M. D., three years.

There has been no case of a contagious disease in town for years. The school-houses are in good order, except that the outhouses are as worthless as none at all. A safer sanitary arrangement would be to have the privies and barnyards placed farther from the wells where the families obtain drinking water. In some cases they are only from six to ten feet apart.

## CORNISH.

Members of the board: Benj. F. Haley, one year; Fred C. Small, two years, Secretary; Wm. B. Swasey, M. D., three years, Chairman and Health Officer.

Ten cases of nuisance have been reported, and of these, six were removed. As a general thing the waste and sink water is not properly disposed of. It is allowed to remain under the windows and too near the wells for safety. In our estimation the one thing needed more than anything else is a system of sewerage. We have built a new school-house this season costing \$7,500. It is heated with steam and is ventilated.

#### CORNVILLE.

Members of the board: D. S. Willey, Secretary; C. E. Smith, Chairman; C. C. Kinsman.

One nuisance was reported and that was promptly removed. There have been no cases of contagious diseases.

#### CRANBERRY ISLES.

Members of the board: Wm. P. Preble, Esq., one year; Wm. E. Hadlock, Esq., two years, Chairman; John Gilley, three years.

No contagious diseases of any kind have occurred excepting two mild cases of typhoid fever. Three of our citizens in the prime of manhood were lost by drowning.

#### CRAWFORD.

Members of the board: A. J. Dwelly, one year; J. P. Jeffery, two years, Secretary; N. S. Fenlason, three years, Chairman.

No contagious diseases. One nuisance which was looked after promptly. One death occurred from drowning.

#### CUMBERLAND.

Members of the board: L. H. Merrill, one year, Chairman; A. H. Grannell, two years; C. T. Moulton, M. D., three years, Secretary.

Two nuisances were reported, both of which were rectified without disturbance or harm in any way. Nine cases of diphtheria with three deaths, one case of scarlet fever recovering and three cases of typhoid fever with one death have occurred in the town. Of the nine cases of diphtheria five were on Chebeague Island and the three deaths were there. Four of these cases occurred before the first of April and consequently were not reported to the local board. The best recommendation which I can make for improving our sanitary condition is to educate the people in all hygienic matters.

## CUSHING.

Members of the board: T. C. Hathorne, one year; Samuel Payson, two years, Chairman; W. B. Bradford, three years, Secretary.

No cases of diphtheria, scarlet fever or typhoid fever have occurred, excepting one case of scarlet fever which was present before the board was organized.

## CUTLER.

Members of the board: O. A. Davis, one year; M. W. Ackley, two years, Chairman; C. G. Aldrich, three years, Secretary.

One nuisance was reported to the board. There have been two cases of scarlet fever, and one case of typhoid fever with one death from each disease. This place has generally been considered very healthy. This being our first year in the capacity of a board of health our work has been limited, but we hope by observation combined with what little experience we have to be of service when needed.

## DAMARISCOTTA.

Members of the board: Chas. Metcalf, one year; Jas. Hilton, two years, Chairman; J. M. King, M. D., three years, Secretary.

On the main street in this village a few of the residences have piped drainage to the river, but there is no general sewerage system. Most of the house drains discharge upon the surface. Several complaints have been made to the board in regard to deposits of filth and garbage and of house drainage. In these cases an investigation was made and instructions were given in regard to removal, which has usually been promptly done. No trouble has arisen in this work.

Three cases of typhoid fever occurred, and measles was present in the spring, but did not become epidemic. Farther than this there have been no cases of the infectious diseases excepting those resulting from the disease which the Secretary of the State Board pronounced scarlet fever, but regarding the nature of which opinions differ. From this disease there were sixty or more cases. No deaths resulted. About one-third of all the cases showed no eruption. Many who had undoubtedly had scarlet fever were supposed to have this, but all in which the former scarlet fever was beyond doubt there was no rash, as also in many who certainly never before had it. No sequelae were observed beyond desquamation. I should say that its spread was by direct contact. I have not observed a case of conveyance, though opportunity had been abundant.



[During the prevalence of the eruptive fever to which the secretary of the local board refers, there was unfortunately a lack of unanimity among the local members of the medical profession. On account of this, Dr. C. A. Packard of Bath was called to see one of the cases and pronounced it positively a case of scarlet fever. Afterward, at the request of both factions, I was called to decide the question and called it scarlet fever. My opinion was based upon a personal examination of a dozen or more persons in the various stages of their illness or convalescence, and upon the results of my enquiries of the attending physicians in regard to those symptoms which would be likely to afford the most help in making a comparative diagnosis.

The following are the notes which were taken of some of the cases from the statements of the attending physicians.

A girl seven years old; temperature from the beginning of medical attendance was  $104^{\circ}$ ; pulse, 132 to 140; rash appeared within twenty-four hours; strawberry tongue, diphtheritic patches in throat; vomiting in stage of invasion; delirium and semi-coma; very marked desquamation, the skin peeling off in flakes.

Patient, a young lady: temperature  $103^{\circ}$ ; pulse 136; rash appeared in twenty-four hours, at first on neck and shoulders, then over whole body; sore throat and diphtheritic patches; strawberry tongue, very marked; vomiting; desquamation, slight.

Boy seven years old: temperature ranged from  $105^{\circ}$  to  $106^{\circ}$  for three days; pulse 150; rash appeared in about thirty-six hours, very vivid scarlet over whole body; throat symptoms quite severe; albuminous urine and for three days partial suppression; strawberry tongue, and afterwards tongue dry and cracked; very delirious three days; desquamation very marked, the skin coming off from the inside of the thighs in flakes and flaps as large as the hand. This was the case which was seen by Dr. Packard and I also saw it in the latter stage of desquamation and when the upper sheet was raised, the lower one was found completely littered with the scales of desquamation.

The majority of the cases, however, appeared to have been mild, and the following case, which was the first one which appeared in the village, may be taken as a fair representative of many others.

Boy four years old: temperature thought to have been  $103^{\circ}$ ; pulse probably 120; rash on second day, on neck and face first spreading over the whole surface; sore throat with some white

patches which disappeared soon ; the rash remained out about four days ; desquamation quite marked.

The eruption in most of the cases was said to have been a uniform scarlet rash ; the only case seen by me in the eruptive stage had a typical scarlet fever eruption.

These notes are here transcribed that the medical reader may judge for himself whether there was probably any truth in the assertion which was emphatically made by some of the physicians of Damariscotta that there had not been a single case of scarlet fever in that town.—SECRETARY.]

#### DANFORTH.

Members of the board : J. P. Ker, M. D., Chairman ; M. L. Porter, M. D., Secretary ; James Carson.

We have succeeded in abating all the nuisances which have been reported to us. The drainage is very poor in the village and we have experienced some difficulty in having the sink drainage properly disposed of. There have been four cases of scarlet fever but no deaths. The cases of scarlatina were promptly isolated and so we have avoided an epidemic. The school-houses are very good, large, and well-lighted.

#### DAYTON.

• Members of the board : E. W. Littlefield, one year ; Benj. Whitehouse, two years, Chairman ; Geo. Sylvester, M. D., three years. Secretary.

No cases of nuisance have come to the attention of the board. No cases of diphtheria occurred, except one case of croup which terminated fatally. There were two cases of scarlet fever, with no deaths, and one case of typhoid fever in which the patient died. More attention to drainage and to the proper disposal of excreta are the things most needed here.

#### DEDHAM.

Members of the board : Geo. W. Gehan, one year ; E. E. Hurd, two years, Chairman ; A. F. Bennett, three years, Secretary.

There has been but little work to do, but we have looked after such matters as have required our notice and we have found the people ready to respond to our wishes. The only case of the infectious diseases which we have had has been one case of typhoid fever in which the patient recovered.

## DEERING.

Members of the board: A. P. Topliff, M. D., Chairman; Geo. P. Sherwood, Secretary; Jos. T. Emerson.

Water is supplied to the thickly settled portion of the town from Sebago lake by the Portland Water Company. There is no general sewerage system in the town. Twenty-nine nuisances have been reported and abated without much difficulty.

We have had fifteen cases of diphtheria with two deaths, three cases of scarlet fever, and two of typhoid fever, with one death from the latter disease. In connection with cases of infectious diseases, the houses have been placarded and the circulars which are issued by the State Board have been left with the families. The executive officer of the board has made a personal inspection of all sections of the town during the last eight months with respect to sink drainage, condition of yards, and of privy vaults. When anything has been found wrong the parties interested have been notified and they have generally complied with the suggestions or requests of the secretary.

## DEER ISLE.

Members of the board: R. R. Knowlton, one year, Health Officer; Andrew J. Beck, two years, Secretary; Seth Webb, three years, Chairman.

We have had fourteen cases of typhoid fever; two cases of scarlet fever. The board has investigated the causes of all contagious diseases and taken proper precautions against the danger of their spreading. In some of the cases of typhoid fever the cause appeared to be insufficient drainage. Improvements have been suggested or ordered in connection with some of the drains, wells, and privies.

## DENMARK.

Members of the board: S. T. Brown, M. D., Chairman; A. M. Deering, Secretary; Joseph Colby.

There have been five cases of typhoid fever, but no deaths from this disease. The school-houses generally are in good condition with one or two exceptions, but some of the out-houses are dangerously near.

## DENNYSVILLE.

Members of the board: Geo. W. Kilby, one year; Benj. Lincoln, two years, Chairman; A. R. Lincoln, M. D. three years, Secretary.

We have had two cases of diphtheria both of which recovered. Tubercular diseases have been quite prevalent and there have also been several cases of membranous croup. No contagious diseases have appeared in connection with the schools except one case of diphtheria. The school was closed and the school-house was thoroughly cleansed. The two cases of diphtheria were probably caused by polluted water.

## DETROIT.

Members of the board: Henry Young, one year, Chairman; David F. Libby, two years; Orville J. Dorman, three years, Secretary.

No cases of contagious diseases except one of typhoid fever.

## DEXTER.

Members of the board: J. W. Leighton, Chairman; Cyrus Foss, Secretary; Charles M. Foss, M. D.

One or two mild cases of typhoid fever were reported. Through August there were a few cases of dysentery of a very malignant type.

The water supply is from wells and from an aqueduct, which takes water from the hills back of the town. A company has lately been formed to take the water from lake Wausookeag. Of the school-houses I would say that the heating is passable, the ventilation is none too good. The water supply is poor, or there is none, and the out-houses are fair for the kind.

## DIXFIELD.

Members of the board: Wm. H. Winslow, one year; P. B. Wing, M. D., two years, Secretary; G. G. Richardson, M. D., three years, Chairman.

Driven wells and aqueducts furnish the greater part of the water supply for the town, and it is generally very good. There was one case of typhoid fever which recovered. Pneumonia has been unusually prevalent. In the summer there was quite an epidemic of dysentery, but I think the summer diarrhoea was less prevalent than usual.

## DIXMONT.

Members of the board: H. F. Benson, M. D., one year; Wm. Harris, Esq., two years, Chairman; W. M. Chapman, three years, Secretary.

We have been exempt from contagious diseases the past year with the exception that there were two cases of mild typhoid fever.

#### DOVER.

Members of the board: G. E. Howard, one year, Secretary; J. Q. Lander, two years, Chairman; J. B. Cochrane, M. D., three years, Health Officer.

We have a water supply which is taken from the Piscataquis river some two miles above the village. Wells and cisterns are also in use. We have some sewers, but no sewerage system. Most of the house drainage discharges upon the surface. Several minor nuisances caused by privies and pig-pens were immediately remedied at the request of the board. Our town has been very free from infectious diseases and there have been only two cases of diphtheria, one of scarlet fever, and one of typhoid fever, the last of which ended fatally. For the restriction of the contagious diseases, the doors have been placarded and we have consulted with the attending physician in regard to the proper cleansing and disinfecting of the premises, clothing, etc. We have made a thorough examination of all privies, cess-pools and drains and when any of them were found in a bad condition we have given directions in regard to their cleaning and improvement, and with one exception there has been a cheerful compliance with our wishes.

#### DRESDEN.

Members of the board: S. D. Houdlette, one year, Chairman; N. F. Leeman, two years, Secretary; C. J. Chaney, three years; G. L. Stimpson, M. D., Health Officer.

There have been no cases of contagious diseases and we have no occasion to do any work.

#### DURIAM.

Members of the board: F. A. Harding, one year; C. W. Goddard, two years, Chairman; J. L. Wright, M. D., two years, Secretary.

Two nuisances were reported to the board and these were attended to without any trouble. There have been no cases of contagious diseases and no other diseases have been unusually prevalent. Fortunately nothing has happened to require any special action. We have, however, been on the lookout for anything that might re-

quire attention and if anything should occur we should be likely to know almost immediately of it.

#### EASTBROOK.

Members of the board: A. P. Bunker, one year, Secretary; L. W. Bunker, Esq., two years; A. W. Googins three years, Chairman.

There have been only two deaths in the town during the year and there were no cases of the infectious diseases.

#### EAST LIVERMORE.

Members of the board: C. W. Brown, one year; C. E. Knight, M. D., two years, Secretary and Health Officer; Henry Reynolds, M. D., three years, Chairman.

Some portions of the town which are supplied with wells have water of poor quality on account of the quality of the drainage. Several nuisances have been reported to us and all but one or two have been disposed of. In one case where the sewer drainage goes into the street there seems to be no other way of disposing of it without carrying it across other men's property which they will not permit.

There have been seven cases of typhoid fever, two of scarlet fever, and several of diphtheria, but no deaths from these diseases. Some of the cases of typhoid fever seemed to be due to impure water. In one family there were three or four cases of typhoid fever in which the sink drainage had polluted the well. We need a system of sewerage in the village.

#### EAST MACHIAS.

Members of the board: J. E. Tuell, M. D., Secretary; A. J. Hanscom; J. R. Talbot, three years, Chairman;

We have no sewerage system. There were no cases of diphtheria or typhoid fever, but we had about fifty cases of scarlet fever with but one death. The scarlet fever cases have, with but few exceptions, had a mild but typical course. In the cases of scarlet fever isolation was directed and also disinfection and fumigation as soon as desquamation has been completed. Many of the cases of scarlet fever were so mild that no physician was called and in these cases no care was taken to isolate or disinfect. It was the desire of the board to stamp out the disease but it was spread broadcast before the board of health was appointed and there were not funerals enough

to bring the necessity of such action into harmony with the public view. It is remarkable that people will rigidly avoid going into a house where there is a severe case but never hesitate to be neighborly if the case is mild.

#### EASTON.

Members of the board: Daniel Smith, one year, Chairman; C. F. Parsons, two years, Secretary; D. Stanchfield, three years.

No report received.

#### EASTPORT.

Members of the board: S. Sherlock, Secretary; Dr. W. F. Cleveland; John Higgins, Chairman.

The town is supplied with water from wells and springs, and as is usual with all such sources in thickly settled places is more or less exposed to impurities from surface drainage and saturation.

The town has several drains and sub drains or sewers, and these were built by individuals and furnish fair drainage, yet a more complete system is needed. A system of general sewerage which the town will probably petition for at the next term of the legislature by recommendation of this board and which if established, together with a system of water works now under contract to be completed by Jan. 1, 1889, supplemented by our superior surface drainage, would result in making Eastport one of the healthiest and best drained towns in the state.

The temporary storage of fish pumice within the business precincts is a serious nuisance which was brought to the notice of this board during the past year. The board in connection with the selectmen will endeavor to abate it by designating locality for storing the same.

Of contagious diseases there have been nine cases of diphtheria with one death, six cases of typhoid fever, and four cases of mumps. All the diseases common to this locality have been less prevalent this year with the exception of rheumatism and pneumonia which have been up to the average. All the cases of diphtheria were of a mild type with the exception of the case which terminated fatally in a child of three years. Three of the cases occurred in one family, and one in a family which was related to the former and lived in the same neighborhood. In the other five cases it could not be learned that they had associated with the first four, or the different families with each other, and we cannot account for the origin of these.

The preventive work which we have done in connection with these infectious diseases has consisted in attaching cards to the infected houses announcing the existence of the disease, notifying the families to exclude visitors and advising them to adopt methods to prevent its spread by burying the excreta, by burning or carefully washing clothing and by fumigation.

In addition to giving proper attention to all cases of contagious diseases which have occurred, this board has corrected several abuses connected with house and sink drainage and for the management of water closets.

#### EDDINGTON.

Members of the board: W. L. Castelow, one year; Wm. E. Merrill, M. D., two years, Secretary; J. J. Temple, three years, Chairman.

There have been no cases of diphtheria or scarlet fever or typhoid fever; measles and pneumonia have been more prevalent than usual. A case came under my observation where a well was located on a slope a few feet below the stable and privy, causing the water to have a bad taste. (?)

#### EDEN.

Members of the board: O. B. Knowles, one year; W. C. Higgins, two years, Chairman; B. Bradley, three years, Secretary.

The water supply is from Eagle lake and is good. We are putting in a new system of sewerage which, when completed, it is supposed will be perfect. There have been fifteen or twenty nuisances reported to the board and they have generally been removed. There have been no cases of contagious diseases in the town excepting measles and mumps and two cases of diphtheria and seven of typhoid fever.

As there have been but few cases of contagious diseases our work has consisted mostly in looking after stables, drainage and places where there are no sewers and the dumping of garbage. The latter has caused us more trouble than everything else together. With an easterly wind that part of it which does not sink is brought back to the harbor. That can be remedied by towing it farther out to sea and this will have to be done.



## EDGECOMB.

Members of the board: Eben Chase, Jr., one year, Secretary; J. A. Merry, two years, Chairman; A. M. Burnham, Esq., three years.

We have had no cases of any of the contagious diseases.

## EDINBURG.

Members of the board: C. W. Eldredge, one year, Chairman; G. H. Eldredge, two years; C. M. Farnham, three years, Secretary.

No cases of contagious diseases have occurred.

## EDMUNDS.

Members of the board: C. C. Hobart, one year; I. H. Allan, two years; John P. Sheahan, M. D., three years, Secretary.

This board was not organized until December. There have been no cases of the infectious diseases.

## ELIOT.

Members of the board: C. H. Guptill, M. D., Chairman; Albert Lord, Esq., Secretary; J. L. M. Willis, M. D.

There have been three cases of diphtheritic sore throat, and one case of typhoid fever which terminated fatally. Pulmonary consumption seems to be increasing. The town has been remarkably free from infectious diseases. The school-houses are all admirably located, have high ceilings and are fairly well ventilated by means of ejector ventilators.

## ELLSWORTH.

Members of the board: Harvard Greeley, D. D. S., one year, Secretary; Emerson Googins, M. D., three years, Chairman; O. M. Drake, M. D., Health Officer.

Our city has been remarkably favored during the past year in regard to diseases of all kinds. We have had no epidemic of any kind with the exception of one of measles during the early summer.

As far as I know there have been only three cases of diphtheria and no cases of scarlet fever.

Our city has no system of sewerage. Contents of cess-pools soak into wells and cellars, contaminating the water and the air. For want of sewers the disposal of excreta is faulty. Poor drains

and privies and the habit of throwing wash water and slops anywhere most convenient are the principal causes in this city of contaminated air, and those sections where they are especially slack in this regard have frequently suffered from diphtheria and scarlatina in the past. We have a fair prospect of having an excellent system of water works in the near future, which in connection with proper drainage would obviate most of the evils above mentioned.

#### EMBDEN.

Members of the board: J. W. Morin, one year; Randall Durrell, two years, Chairman; Cephas Walker, three years, Secretary.

No report received.

#### ENFIELD.

Members of the board: J. R. M. Gilman, Chairman; T. S. Laing, Secretary; A. J. Darling.

One nuisance was reported to the board and this was removed. No cases of the infectious diseases.

#### ETNA.

Members of the board: O. W. Cole, one year; S. J. Locke, two years, Secretary and Chairman; Jas. Goodell, three years.

No cases of the infectious diseases have occurred in the town, but the mortality has been larger than it has been for many years before, viz: there have been six deaths from lung diseases, four from old age, two from cholera infantum, one from drowning, and one from apoplexy.

The board had but little work to do, but its appointment has effected a better care of privies in town, many of which were before a source of disease.

#### EXETER.

Members of the board: W. F. Hart, M. D., Secretary; S. W. L. Chase, M. D.; E. A. Chandler, Chairman.

Owing to the almost entire absence of contagious diseases there has been but little call for action on the part of our board. One case of typhoid fever occurred which ended fatally.

#### FAIRFIELD.

Members of the board: Frank J. Savage, one year; Dr. F. J. Robinson, two years, Chairman; T. G. Heald, three years, Secretary.

No report received.

## FALMOUTH.

Members of the board: Columbus Knight, one year; D. F. Small, two years, Secretary; Hawley Folsom, three years, Chairman; F. C. Dolley, M. D., Health Officer.

No complaints of nuisances have been made to this board. There have been three cases of diphtheria and two of typhoid fever. When cases of the infectious diseases have occurred we have notified the inmates of the infected house to isolate themselves. We have also seen that proper disinfection was done. Both cases of typhoid fever seemed to have been caused by polluted water, due in each case to the drainage from the sink being allowed to discharge on the surface of the ground near the well, with a filthy privy also in each case near the well.

With few exceptions the school-houses in this town are in a bad condition. I would advise the abolition of the district system as a sanitary measure. We could then have better school-houses and better supervision. We have carefully looked into the sanitary condition of all our public buildings.

## FARMINGDALE.

Members of the board: D. E. Marshall, one year; A. C. Stilphen, two years, Chairman; F. M. Putman, M. D., three years, Secretary.

The water supply of the village is furnished by the Gardiner water company. Two nuisances were reported to the board and both were removed. No cases of the infectious diseases have been reported. One case of glanders occurred in a horse which was killed in accordance with the orders from the State Cattle Commission.

## FARMINGTON.

Members of the board: A. F. Gammon, one year; Capt. C. W. Keyes, two years, Chairman; F. O. Lyford, M. D., three years, Secretary.

The water supply is from springs and wells; that from the springs is, as a general thing, pure, while that from the wells is often contaminated with surface drainage and with soakage from cess-pools and privies. There is no system of drainage or sewerage.

Twenty-two nuisances have been reported to the board. Nine cases of diphtheria with two deaths. Typhoid fever, thirteen cases with two deaths. Typhoid fever has been more prevalent than usual, caused, in my opinion, by polluted water. Houses where there are cases of the infectious diseases have been placarded and the sick and their families have been isolated.

We need a system of sewerage and of water supply. A change is required in regard to cess-pools, sink spouts, and privies as in many cases they are within thirty feet of the wells. One part of the village is made unhealthful by the pollution of the stream by the tannery refuse.

#### FAYETTE.

Members of the board: H. I. Wing, one year, Chairman; J. S. W. Hewett, two years, Secretary; A. F. Watson, three years; Chas. Russell, M. D., Health Officer.

One nuisance in the shape of an offensive privy vault was reported. It was removed. One case of typhoid fever occurred. No particular disease has been very prevalent.

We have an abundance of good water and pure air, and sickness rarely crosses our boundaries. Scarlet fever has not prevailed here in the twenty-three years that I have lived in town, though we occasionally have sporadic cases. None of my ten children, the youngest fifteen years of age, have had it. Diphtheria has appeared in the same sporadic form and occasionally chicken-pox, mumps, whooping cough and measles make us a visit in a mild form.

#### FOREST CITY.

Members of the board: J. A. Lambe, one year, Secretary; Fred Brannen, two years, Health Officer; John E. Haley, three years, Chairman.

No report received.

#### FORT FAIRFIELD.

Members of the board: Dr. A. D. Sawyer, one year, Chairman; Dr. E. E. Shaw, two years; N. H. Martin, B. S., three years, Secretary.

We have had comparatively few cases of any disease, but there were two cases of typhoid fever. Better facilities are required for house and privy drainage. We ordered all privy vaults to be cleaned out before May 10th, and rubbish to be cleared away.

## FOXCROFT.

Members of the board: John F. Arnold, one year; Chas. C. Nichols, two years, Secretary; Osgood P. Martin, three years, Chairman.

The water supply is from wells, cisterns, and river water. We have no system of sewerage. Three nuisances were reported and all were removed.

Three cases of diphtheria occurred. The infected houses have been placarded. The most we have had to do is to look after privies and cellars. We have had but little trouble as the people have always done as directed.

## FRANKFORT.

Members of the board: E. W. Temple, M. D., one year, Secretary and Health Officer; Chas. A. Averill, two years; F. L. Tyler, three years, Chairman.

Ten nuisances have been reported to the board, all of which have been removed. A certain row of tenement houses in the village is so placed that the rear of the houses is projected against a steep bank while the front of the building comes out flush with the sidewalk. No system of sewerage being supplied to the town, and there being no possible way to drain except into the street, the privies overflow and drain under the house or into the street.

There have been eleven cases of typhoid fever, all of which recovered, and pneumonia and cholera infantum have been more prevalent than usual. I am certain that all the cases of typhoid fever but one resulted from contaminated water; the eleventh and last case came from another town where he had lived all summer in a crowded boarding house. All the cases of cholera infantum have been due to faulty methods of feeding, and particularly to the use of the nursing bottle with the long rubber tube.

I am happy to be able to say that in nearly every instance of nuisance the owners of the property have given us their hearty support in producing a more healthful condition of things.

## FRANKLIN.

Members of the board: Zibal Wilbur, one year, Chairman; Chas. T. Bunker, M. D., two years, Health Officer; H. H. Homer, three years, Secretary.

Scarlet rash made its appearance here in September, 1886, and from that time to the following May about one hundred cases occurred, with no deaths. I found that children communicated the disease during the entire period of desquamation which lasted for weeks and even after the period of desquamation was completed where proper care had not been taken to cleanse and disinfect. In September, a little girl from this place while visiting in Lawrence, Mass., took scarlatina and died there. Her little sister at home took the disease after her clothing had been sent back.

In August, diphtheria was imported from Sullivan and twelve cases with two deaths occurred. The disease was checked after a hard fought battle of nineteen days.

#### FREEDOM.

Members of the board: C. E. Smith, Chairman; J. W. Mitchell, M. D., Secretary.

Our town has been very free from the contagious diseases, only two cases of diphtheria having occurred during the year.

#### FREEMAN.

Members of the board: J. B. Carvill, one year; N. H. Peterson, two years, Chairman; Nelson Walker, three years, Secretary.  
No report received.

#### FREEPORT.

Members of the board: Benj. P. Soule, one year; J. P. Merrill, two years, Chairman; E. E. Pinkham, three years, Secretary.

Several nuisances have come to our notice which have been mostly in connection with our school buildings and their adjoining out-buildings. The bad conditions which we have there, we hope to amend at once.

We have had one case of typhoid fever, and seven cases of scarlet fever with one death.

#### FRIENDSHIP.

Members of the board: Jas. Parsons, one year; Nelson Thompson, two years, Chairman; T. G. Lyons, three years, Secretary.

Three cases of scarlet fever and one of typhoid fever have occurred. Care was taken in these cases to isolate the patients in their homes.

## FRYEBURG.

Members of the board: Eckley Ballard, one year; Thos. C. Shirley, two years; D. L. Lamson, M. D., three years, Secretary, Health Officer and Chairman.

Two nuisances have been reported to the board, both of which were removed. There have been no cases of diphtheria or scarlet fever, but there have been three cases of typhoid fever.

We have a public water supply which is taken from Rocky Springs, Green Mountain.

## GARDINER.

Members of the board: V. R. Beedle, one year; E. E. Lewis, two years, Secretary; W. P. Giddings, M. D., three years, Chairman.

Seventy-four complaints have been made to this board this year of nuisances existing, all of which have been attended to and promptly abated by the parties responsible, with two or three exceptions. We occasionally find a man, however, who thinks he has a right to do as he pleases on his own premises, and so long as he can stand it, his neighbors have no right to object. The remedy for these cases where it has been applied, we are happy to report, has effected a permanent and radical cure. A large number of unwholesome and dangerous places have been looked after and taken care of without complaint being made. But very few of the cases of sickness from diseases rated as contagious, which have occurred within our limits during the past year, have been reported to the board as required by law, either by the "householder" or the attending physician. In the future this rule will be rigidly enforced, and we would respectfully call attention to the statute law relating to the same.

On the evening of November 30, 1887, a case of small-pox was reported at the house of Mr. Williams on Central street. The house was immediately quarantined, and everything done that could be to prevent the spread of the disease and to alleviate the suffering of those afflicted; and all with the happiest result, only the one case occurring. The thanks of this board are due to Dr. J. M. Turner, the attending physician, for the prompt notice given and for his hearty co-operation throughout. Thanks are due also to the Secretary of the State Board of Health, for his active interest and advice. The president of this board, Dr. W. P. Giddings, visited the patient

immediately after receiving the notice, to insure the taking of proper measures for the continual disinfection of the premises, and all other necessary sanitary precautions.

#### GARLAND.

Members of the board: E. L. Oak, one year, Chairman; M. C. Jennings, two years; F. A. C. Emerson, three years, Secretary.

Our supply of drinking water all comes from wells. It is generally characterized by an abundance of carbonate of lime, and I believe it contains some chloride of sodium not derived from surface water as well as much that is so derived.

The diseases most prevalent during the past year were typhoid fever of which there were ten non-fatal cases and the diarrhœal diseases of children. A careful consideration of the circumstances leads me to believe that the unusual amount of warm wet weather in connection with the usual unsanitary condition of drains, privies, etc., by affording unusual facilities for surface fermentation, is to be accepted as the explanation of the frequency of these diseases.

Tuberculosis has occurred in one herd of cattle, and two cases of farcy have been noticed in horses.

#### GEORGETOWN.

Members of the board: John Hunt, one year, Chairman; John L. Berry, two years, Secretary; Benj. Rowe, Jr., three years.

We have had no cases of diphtheria or typhoid fever. Two cases of scarlet fever occurred, both of which ended in recovery. The houses where these cases of scarlet fever occurred were placarded, and after recovery the disinfection was done by the secretary of the board personally, or under his direction.

#### GILEAD.

Members of the board: E. Harriman, one year; E. E. Kimball, two years, Chairman; A. M. Whitman, three years, Secretary.

No cases of the contagious diseases have occurred and no diseases have been very prevalent, excepting during the warm weather, the summer complaint of children.

#### GLENBURN.

Members of the board: Elisha Hill, one year, Chairman; Fred Cort, two years; Fred L. Brown, three years, Secretary.



No cases of contagious diseases have occurred in this town during the time which is covered by this report.

#### GORHAM.

Members of the board: A. W. Lincoln, M. D., one year, Chairman and Health Officer; G. W. Heath, two years, Secretary; Caleb G. Carver, three years.

Nineteen nuisances have been reported to the board and all of them were removed. With but one exception we have met with no opposition in carrying out our work of sanitary improvement, but we have had the hearty co-operation of our citizens generally in our efforts to bring about a better condition of things.

We have had two cases of diphtheria, thirty-nine of scarlet fever, and five of typhoid fever, with two deaths from the latter disease. The epidemic of scarlet fever which prevailed in the autumn and early part of the winter was in a very mild form, and no deaths have yet occurred from it. Teachers have been notified of infected houses and warned against admitting persons from these dwellings, and pupils have been excluded from the schools until there has been a full compliance with the regulations prescribed by the State Board.

One of the cases of typhoid fever was traceable for its cause to a defective drain which was connected with a pipe leading from a sink.

Our sanitary work could be carried out much better if a yearly appropriation were made by the town at the disposal of the municipal officers to be expended in employing such persons as the local board of health may engage to do such work as may be found necessary to improve the sanitary condition of the town.

#### GOULDSBORO'.

Members of the board: F. R. Bunker, one year, Secretary; R. R. Joy, two years, Chairman; C. C. Larrabee, M. D., Health Officer.

Only one nuisance was reported to the board and this was immediately removed when the person who was responsible for it was reminded of it. We have had no cases of the contagious diseases.

#### GRAY.

Members of the board: J. F. Rowell, D. D. S., one year; E. A. McCollister, M. D., two years, Chairman; E. T. Andrews, M. D., three years, Secretary.

The water supply of the village is from wells, cisterns and aqueducts the latter having their source from springs on a hill near the village.

Two nuisances were reported to the board and both were removed. There have been two cases of diphtheria and two of typhoid fever with no deaths. Cases of infectious diseases have been isolated and cards stating the nature of the disease have been placed upon the house.

#### GREENBUSH.

Members of the board: E. F. Littlefield, one year; W. W. Harris, two years, H. F. Harris, three years, Secretary.

There have been no cases of the contagious diseases excepting one mild case of diphtheria.

#### GREENE.

Members of the board: A. Pierce, M. D., one year; E. L. Mower, two years, Chairman; John E. Sawyer, three years, Secretary.

No nuisances were reported to the board. Of contagious diseases there have been two cases of typhoid fever which were fatal, one case of diphtheria and eight cases of measles. The first case of measles was supposed to have been taken on the night train between Lewiston and Greene.

#### GREENFIELD.

Members of the board: Samuel Wheeler, one year; Jas. Doyle, two years, Health Officer; M. C. White, three years, Secretary and Chairman.

No cases of the infectious diseases have occurred.

#### GREENVILLE.

Members of the board: F. W. Knowlton, one year, Secretary; Leonard Young, two years; H. A. Sanders, three years, Chairman; H. Hunt, M. D., Health Officer.

About a dozen cases of nuisances were reported to the board, and all were removed which were so ordered after an investigation by the board.

We have had one case of small-pox which ended in recovery, six cases of diphtheria with one death, and ten cases of scarlet fever

and six of typhoid fever with no deaths. The case of small-pox was in the person of an Italian workman on the railroad. No diseases have been especially prevalent, excepting a peculiar fever among the railroad employes. All the cases of typhoid fever seemed to be traceable to impure water, and one case of fatal Bright's disease in a railroad foreman was attributed by his men to the drinking of marsh water. Two deaths occurred from drowning.

#### GREENWOOD.

W. B. Rand, one year, Secretary ; Wm. Richardson, two years, Jos. A. Fairbanks, three years, Chairman.

No cases of contagious diseases have occurred.

#### GUILFORD.

Members of the board : C G Robbins, one year, Chairman ; L. H. Whittier, two years ; Z. L. Turner, three years, Secretary ; C. B. Bennett, M. D., Health Officer.

One nuisance was reported and this was promptly removed at the request of the board. No cases of contagious diseases have occurred excepting one case of scarlet fever in which the patient recovered. There are no particularly unhealthy places in the town excepting some boggy and marshy land in the north and east parts, the health conditions of which could probably be improved by drainage.

#### HALLOWELL.

Members of the board : E. W. Maddox, one year ; J. T. Chase, two years, Chairman ; J. M. Eveleth, M. D., Secretary.

We have a public water supply which furnishes water to nearly half the city. Its source is in some springs about a mile and a half away. A few families bring water from private springs and the remainder obtain water from wells. We have a partial system of sewerage and the drainage from some of the houses is carried into these public sewers, but in most cases excreta and kitchen wastes go into cesspools or upon the surface of the ground.

Five nuisances have been reported to the board and others have come to our notice. Usually there has been no difficulty in getting them removed without any legal process.

We have had eleven cases of diphtheria with four deaths, three cases of scarlet fever, and one of typhoid fever in which the patients

recovered. When cases of the contagious diseases have been reported we have consulted the attending physician and generally have found him and the family willing to do what is right; if so, we have trusted in great measure to them. In one case we found it necessary to station a watchman at the house to prevent persons going in and out. There were four cases of diphtheria in this house and two deaths occurred, but by taking these precautions the spread of the disease was prevented.

We need better sewerage and a better supply of water.

#### HAMPDEN.

Members of the board: F. G. Rogers, one year, Chairman; W. H. Nason, M. D., two years, Secretary and Health Officer; C. F. Cowan.

One nuisance only was reported to the board and that was promptly removed upon notification. There were three mild cases of typhoid fever. Measles have been epidemic and there has been considerable prevalence of diarrhoeal diseases with aged people. The condition of the out houses is the worst feature in connection with the school-houses. In many cases the filth is removed only when it becomes filled to the seats and in some cases it has remained for years without removal. On a small stream which passes through the town there were formerly two paper mills which have since been burned, and the families along this valley had much sickness of various kinds which seemed to have been caused by impure air and water. Since the removal of the mills from the stream their health conditions have been bettered very much. A boy of twelve years who had all the symptoms of typhoid fever except iliac tenderness, and, also, during the whole course of his illness one and sometimes two attacks in the twenty-four hours of profuse sweating. The origin of the trouble was thought to have been in his accidentally swallowing some of the water from a barrel containing a watery infusion of the fertilizer for use on the garden.

#### HANCOCK.

Members of the board: A. B. Crabtree, one year, Chairman; Marcus Mullen, two years; S. N. McFarland, three years, Secretary.

We have been ready to do any work which may present itself, but we have had no cases of the infectious diseases and have had no nuisances reported to us, and can report no active work.

## HANOVER.

Members of the board: C. B. Frost, one year, Chairman; J. B. Roberts, two years, Secretary; A. T. Powers, three years.

There were no cases of infectious diseases excepting one case of typhoid fever. In this case I visited the attendants and furnished them with circulars and made suggestions in regard to the proper disposal of excreta, etc., and as the case was in very careful hands it required no farther attention from us.

## HARMONY.

Members of the board: S. Leighton, one year; M. J. Merrill, two years, Secretary; L. S. Reed, three years, Chairman.

Three nuisances were reported to the board and we found no difficulty in removing them all. Measles has been prevalent and there have been five cases of scarlet fever, but no deaths from it.

## HARPSWELL.

Members of the board: Jas. S. Farr, Secretary; Geo. H. Dearbon, Chairman; John M. Stinson.

No nuisances have been reported to the board. One case of diphtheria or diphtheritic croup ended fatally, and there were four cases of typhoid fever, but with no deaths. The cases of typhoid fever were thought to have been caused by polluted water.

## HARRINGTON.

Members of the board: G. H. Walling, M. D., one year, Chairman; C. S. Wass, two years; J. T. Putnam, three years, Secretary.

No nuisances were reported to the board. There have been no cases of diphtheria or scarlet fever and only one case of typhoid fever, which recovered. The village is supplied with water from springs brought through an aqueduct. It would be a sanitary improvement if there were more care taken as regards privies and sink spouts, especially school-house privies.

## HARRISON.

Members of the board: S. L. Weston, one year, Chairman; H. H. Cole, M. D., two years; Alphonso Moulton, three years, Secretary.

Two nuisances were reported and both were promptly removed. There have been no cases of diphtheria or scarlet fever, but there were two fatal cases of typhoid fever in the early part of the year before the organization of the board. Measles entered one school and the scholars from the infected families have been excluded from the school-room until the danger passed.

In two or three houses in one part of the village cases of throat disease are numerous and are probably caused by bad drainage. A sanitary improvement would be effected by better privies and a more general use of disinfectants and absorbents in them, and by a better disposal of kitchen wastes.

#### HARTFORD.

Members of the board: L. H. Maxim, M. D., one year, Secretary; Wm Cushman, two years, Chairman; Jas. Irish, three years.

We have had no cases of scarlet fever or typhoid fever, but there were three mild cases of diphtheria.

Last year a family in this town were prostrated with general debility but there appeared to be no particular disease. It was found that there was water in the cellar, and digging up the cellar drain which passed within ten feet of the well, it was found that the drain had been filled and obstructed with decayed apples and potatoes which the rats had carried into it. After the obstruction of the drain was removed the sickness of the family disappeared.

#### HARTLAND.

Members of the board: John Larrabee, one year; A. W. Miller, two years, Secretary; E. A. Bean, M. D., three years, Chairman.

Four nuisances have been abated by the board during the year. There have been two cases of typhoid fever, and two cases of diphtheria with no deaths from either disease. There were two cases of croup, both of which ended fatally.

#### HAYNESVILLE.

Members of the board: J. H. Brown, one year; A. G. Chambers, two years; W. H. Chambers, Jr., three years, Secretary.

There was one case of typhoid fever and one death.

## HEBRON.

Members of the board: G. W. Bearce, one year; F. R. Glover, two years, Secretary; H. A. Cushman, three years, Chairman; Dr. J. C. Donham, Health Officer.

One nuisance was reported to the board and it was removed. There have been no cases of the specified infectious diseases since the board was organized.

During September and October all the members of a certain family were prostrated with what the physician called a catarrhal fever, but which the public pronounced typhoid fever, contracted from a sink drain which was uncovered for several weeks prior to the breaking out of the disease.

A marked case of spinal meningitis occurred in a colt, in December, and two more cases not so well marked appeared in two other colts. One of the animals died, and the post mortem showed the spinal cord stiffened and œdematous from the medulla down. Cerebellum, on one side the coverings were not involved.

## HERMON.

Members of the board: J. W. Tuesley, one year; F. A. Bishop, two years, Chairman; F. P. Whittaker, M. D., three years, Secretary.

Four cases of nuisance have been reported to the board, and they were removed. We have had three cases of typhoid fever. There has, perhaps, been a somewhat greater number of cases of rheumatism than usual, and I think that low swampy lands in the neighborhood have had something to do with them.

At one of the meetings of the board the secretary was directed to look after the sanitary condition of the town and he visited and advised changes in eleven places. Privies were caused to be cleaned and road dust was ordered to be put in twice a week; cellars where it was necessary were cleaned, and in one case the proper disposal of sink drainage was effected, and in another case a suspected well water was sent to the State board for analysis.

## HIRAM.

Members of the board: C. E. Wilson, M. D., Secretary; A. K. P. Googins, M. D., Chairman; Sam'l D. Wadsworth.

We have had one case of diphtheria, two cases of typhoid fever. In the case of diphtheria strict isolation was instituted and the further spread of the disease was prevented.

Our board has done but little but I think that all has been done that was needed under the circumstances. The people are alive as regards hygiene, as far as their knowledge leads them.

#### HODGDON.

Members of the board: Moses Benn, Secretary; Wm. Atherton; Jas. V. Tabor, M. D., Chairman and Health Officer.

Nine cases of diphtheria with no deaths were reported to the board. Some of these diphtheria cases were sporadic while in others the disease appeared to be transmitted by contagion. The cases have been isolated and fumigation has been practised.

#### HOLDEN.

Members of the board: P. L. Pond, Secretary; Geo. C. Wiswell, Chairman; Alex Tirrill.

Two slaughter houses were in a very unhealthful condition, but as soon as notified the owners put them into a condition satisfactory to the board.

We have had four cases of diphtheria with one death, and one person sick with typhoid fever, who recovered.

#### HOLLIS.

Members of the board: F. J. Dennett, one year, Secretary; E. E. Abbott, two years; Jos. L. Smith, three years, Chairman.

One school-house privy was reported as a nuisance and the objectionable condition of it was remedied.

We have had eight cases of typhoid fever with four deaths. All the cases of the infectious diseases coming to our knowledge have been immediately reported to the State board, the infected houses visited, and arrangements made for disinfecting rooms, clothing, etc., and circulars have been distributed giving information in regard to preventive measures.

#### HOPE.

Members of the board: A. P. St. Clair, Secretary.

We have had two cases of diphtheria during the year, both of which ended in recovery. There have been nine deaths in the town during the year, none of which were from contagious diseases. Four of the decedents were 80 years of age or more, and one each was aged 77, 67, 39 and 23 years, and one was two months old.



## HOULTON.

Members of the board: Lewis B. Johnson, one year, Chairman; C. E. Williams, M. D., two years, Secretary; Geo. Cary, M. D., three years.

The village water supply is from the Houlton Water Company and from wells. The character of the water company's water is very good and pure. That from many of the wells is impure and very hard. At present no system of sewerage, but a sewer company has been organized and incorporated and quite an extensive work will be commenced next season.

About thirty nuisances have been reported to the board. In nearly all instances upon notification by the board they have been abated so far as could be reasonably required.

Forty-five cases of diphtheria have been reported to the board with seven deaths, and sixteen cases of typhoid fever with no deaths.

Diphtheria was unusually prevalent. The methods of disposal of excreta and the waste from houses are faulty. The cumulative privy system, lack of drainage, impure well water which was contaminated by soakage from stables and other outbuildings, in not a few instances were the evident sources of the disease. Lack of proper isolation among members of families in some instances caused contagion. A few cases were traced to other towns as sources. In nearly every instance in which cases of the contagious diseases have occurred the house has been visited, and the occupants instructed as to the danger of contagion, the necessity of isolation and the use of disinfectants. In a few cases it has been necessary to employ the services of an officer in enforcing the requirements.

In the case of one of the village school-houses, where the scholars were overcrowded, the building became an object of suspicion as being a possible source of diphtheria contagion. Thorough disinfection was made and no suspicious cases afterward occurred.

Six of the cases of typhoid fever were traced to the probable contamination of well water. One child was drowned, and another child died from naphtha burning.

## HOWLAND.

Members of the board: Wm. Sweat, one year, Secretary; J. O. Davis, two years; R. Q. Lancaster, three years, Chairman.

No nuisances were reported, but one or two came to the notice of the board and were abated.

Measles has been quite prevalent. The disease was brought here by foreign workmen. Pinkeye amongst horses has also been very prevalent and the disease was imported in railroad horses from New Brunswick and Canada.

#### HUDSON.

Members of the board: A. J. Peirce, Secretary; H. S. Willey, Chairman; Leander Davis.

We have had no cases of the infectious diseases.

#### HURRICANE ISLE.

Members of the board: T. F. Haley, one year; John Donahue, two years, Chairman; T. W. Sullivan, three years, Secretary.

No report received.

#### INDUSTRY.

Members of the board: H. B. Luce, one year; C. W. Gilman, two years, Chairman; Wm. C. Hatch, M. D., three years, Secretary.

No cases of the infectious diseases have been reported to this board. The work of the board has been mostly that of individual members. By careful study they have labored to inform themselves in sanitary matters and thereby be prepared to act wisely in any emergency that may demand their attention. The board, by a conservative course, has labored to avoid gaining the ill will of the public.

#### ISLAND FALLS.

Members of the board: Alphens Craig, one year, Chairman; M. L. Emerson, two years; Geo. H. Donham, three years, Secretary.

No cases of the infectious diseases have been reported.

#### ISLE AU HAUT.

Members of the board: Joshua T. Barter, one year, Health Officer; Jas. Robinson, two years, Chairman; W. G. Turner, three years, Secretary.

Measles was prevalent in July, and one of the schools had to be closed.

#### ISLESBORO.

Members of the board: Jos. A. Sprague, one year, Secretary; W. S. Pendleton, two years; Nelson Gilkey, three years, Chairman.

We have had one case of diphtheria and measles was imported into the town.

#### JAY.

Members of the board: E. W. Gould, one year, Chairman; Warren Leland, two years; J. H. Merritt, three years, Secretary.

We have had one case of diphtheria in the town. The whole number of deaths in town for the year was six; consumption, 1; pneumonia and paralysis, two each; and one child found dead in bed.

#### JEFFERSON.

Members of the board: Jas. H. Noyes, one year; Frank Partridge, two years, Chairman; J. J. Bond, three years, Secretary.

No cases of the infectious diseases have occurred.

#### JONESBORO'.

Members of the board: Ansel Tupper, one year, Chairman; Edwin Varney, two years; E. M. Watts, three years, Secretary; Dr. H. H. Smith, Health Officer.

One nuisance was removed by order of the board. There have been no cases of the infectious diseases. One death occurred from drowning.

#### JONESPORT.

Members of the board: Henry L. Watts, one year; J. W. Peasley, two years, Secretary; Chas. H. Cummings, three years, Chairman.

We had eighteen cases of scarlet fever with two deaths, and one case of typhoid fever. One case of fatal drowning occurred. We tried very hard to eradicate the scarlet fever and we were very successful in the village.

#### KENDUSKEAG.

Members of the board: J. F. Beath, one year, Chairman; W. K. Nason, two years, Secretary; G. W. Worster, three years.

Only one nuisance was reported to the board and that was remedied. We have had no cases of the contagious diseases, excepting two cases of typhoid fever and in both of these the patient recovered. In these cases we gave the necessary instruction regarding the disinfection.

## KENNEBUNK.

Members of the board: F. M. Ross, M. D., one year, Chairman; John Cousens, two years; W. L. Dane, Esq., three years, Secretary.

Six nuisances have been reported and abated. We have had four cases of mild and one of severe diphtheria, but no deaths from this disease. We have also had thirteen cases of scarlet fever with one death and three of typhoid fever with no deaths. Scarlet fever was brought from Canada by a French family and introduced into the schools before we knew it. We immediately ordered isolation of the patients and the closure of the schools.

We have taken faithful cognizance of every nuisance and contagious disease reported to us and believe we have in a small measure added to the already well known good sanitary condition of our village.

## KENNEBUNKPORT.

Members of the board: J. E. Seavey, one year, Secretary; F. H. Cousens, two years; W. H. Sawyer, M. D., three years, Chairman.

Four nuisances were reported to the board and these were removed. We have had two cases of diphtheria and two of typhoid fever with one death from the latter disease.

## KINGFIELD.

Members of the board: J. E. Voter, one year, Secretary; C. O. Wilkins, two years; Wm. Gilbert, three years, Chairman.

The one nuisance reported to the board was removed as soon as the owner was notified by us. There have been three cases of diphtheria, but no deaths from that disease. The patients have been isolated and instructions have been given in regard to disinfection.

You will see by our report that our labors have not been great, but whenever we have had a duty to perform, the people have complied with our orders with pleasure and with dispatch.

## KITTERY.

Members of the board: L. O. Buzzell, M. D., one year, Secretary; A. W. Johnson, M. D., two years; M. F. Wentworth, M. D. three years, Chairman.

No cases of contagious disease have been reported to the board. The condition of the school-houses in Kittery is about the same as in most other country towns in the State,—that is, about half a century behind the times.

#### KNOX.

Members of the board: H. W. Wescott, one year, Secretary; J. R. Sparrow, two years; J. P. Wentworth, three years, Chairman. We have had one case of typhoid fever.

#### LAGRANGE.

Members of the board: H. B. Billington, one year, Secretary; Wm. B. Danforth, two years; J. H. McGregor, M. D., three years, Chairman.

We had two cases of typhoid fever, both recovering.

#### LAMOINE.

Members of the board: I. N. Salisbury, one year; W. S. Hodgkins, two years, Secretary; E. H. King, three years, Chairman.

No cases of the infectious diseases have occurred.

#### LEBANON.

Members of the board: John S. Parker, one year, Secretary; S. D. Lord, two years; J. C. Lord, three years, Chairman.

We have had five cases of typhoid fever. Measles entered one school and the school was stopped for two weeks.

#### LEE.

Members of the board: C. E. Ludden, one year, Secretary; A. K. Lewis, two years; J. M. Daniels, three years, Chairman.

We had two light cases of diphtheria. Measles has been very prevalent.

#### LEEDS.

Members of the board: Albert Barker, Esq., one year, Chairman; R. S. Loring, M. D., two years; H. M. Brewster, three years, Secretary.

One nuisance was reported to the board and this was removed. We have had one case of scarlet fever and seven of typhoid fever. The typhoid fever was brought by a fireman who ran on the train from Farmington to Lewiston, and who was taken sick and came to

the home of his sister, Mrs. P., August 25th. In this family there are ten children from three to seventeen years of age. September 23d, Mrs. P. was taken with the same disease in a mild form; the other attacks in the same family occurred as follows: October 4th, a son, aged seventeen; soon after, a girl five years old, and a child three; December 12th a boy of fourteen; December 24th, a girl of eight.

#### LEVANT.

Members of the board: C. M. Page, one year, Chairman; C. W. Fernald, two years, Secretary; A. M. Purington, M. D., three years, Health Officer.

We have had no cases of contagious diseases.

#### LEWISTON.

Members of the board: C. V. Emerson, Esq., one year, Secretary; J. A. Donovan, M. D., two years; O. A. Horr, M. D., three years, Chairman.

The water supply taken from the Androscoggin river is abundant. The character of the water is said to compare favorably with that of other river waters.

The city proper has a system of sewers, as yet it is not extended to all parts of the city, but this is contemplated. The sewerage system has many imperfections; in some places the sewers are not low enough to perfectly accommodate some premises. In the unsewered part the contents of the vaults are removed into the country. The sewers discharge into the Androscoggin river.

Thirty-six nuisances have been reported to the secretary, twenty of which have been abated. Besides these several localities of considerable extent may be regarded as nuisances,—places which are not reached by the public sewers. The number of nuisances which we here report does not include a large number that were of minor importance, such as exposed garbage, decayed fruit thrown into the street, etc. Some member of the board has given personal attention to every case of nuisance so far as known. Scores of places have been visited and directions and suggestions have been offered.

Our efficiency has been seriously cramped for want of funds as no appropriation was made for this department by the city government.

Nine cases of diphtheria with one death, nine of scarlet fever and fourteen of typhoid fever have been reported to the board.

To improve our sanitary condition we need the extension and perfection of our sewerage system and a better supply of drinking water.

#### LIBERTY.

Members of the board: Q. F. Bean, one year, Chairman; Geo. F. Hunt, two years, Secretary; A. A. Brown, three years; E. A. Porter, M. D., Health Officer.

One nuisance has been reported to the board. It consisted of a slaughter house which had a cellar under it hollowed out of a ledge and stood nearly full of water which oozed out of a rock. Into this basin or cellar all of the blood and offal fell and in this mire several hogs and pigs were kept wallowing about. The stench arising from this place was terrible in hot weather and obliged the neighbors to keep their windows closed when the wind was in the right direction to bring the smell.

We have had one case of typhoid fever, and there have been several outbreaks of measles. Cases of the infectious diseases have been properly isolated and disinfection has been thoroughly carried out. A fatal case of puerperal fever occurred in a house where another patient had had the same disease six weeks previously, but recovered.

#### LIMERICK.

Members of the board: J. Holland, Jr., one year, Chairman; C. F. Libbey, two years; J. N. Plaisted, three years, Secretary.

No report received.

#### LIMESTONE.

Members of the board: E. G. Weymouth, one year, Chairman and Health Officer; M. Trafton, two years; A. D. Hatfield, three years, Secretary.

Five cases of nuisance were reported to the board and all were removed.

Nine cases of diphtheria occurred with two deaths, and eight cases of typhoid fever with one death.

#### LIMINGTON.

Members of the board: W. S. Small, one year, Secretary; S. M. Bradbury, M. D., two years, Chairman; J. F. Moulton, M. D., three years.

There have been five cases of typhoid fever all of which recovered. Measles and chicken-pox have been prevalent.

#### LINCOLNVILLE.

Members of the board: R. B. Sherman, one year, Chairman; H. A. Pierce, two years; E. F. Brown, M. D., three years, Secretary.

Two nuisances were reported to the board, and these were removed. We have had two cases of typhoid fever.

School-house vaults have been cleaned, nuisances have been removed, and pure water has been brought into the village from a spring. There are several lakes in Lincolnville, the water in which is very pure. The shores and bottoms of the lakes are sandy. Very few towns can boast of so pure a water supply as Lincolnville.

#### LINNEUS.

Members of the board: Simon Carpenter, one year; Jas. F. Bither, two years, Chairman; Robert Boyd, M. D., three years, Secretary.

We have had five cases of diphtheria, one of which was fatal. One nuisance was reported to the board and removed.

#### LISBON.

Members of the board: F. A. Jordan, one year; C. B. Plummer, two years, Secretary; N. J. Shaw, three years, Chairman; A. W. Potter, M. D., Health Officer.

We have had five cases of diphtheria with one death, and four cases of typhoid fever with one death. Measles has been prevalent.

#### LITCHFIELD.

Members of the board: Enoch Adams, M. D., one year; Gardiner Roberts, Jr., two years, Secretary; Thos. Holmes, three years.

There have been six cases of typhoid fever in town. The first case was imported from Lewiston. The board has given advice to the uninformed in regard to various sanitary matters, investigated the origin of the primary case of typhoid fever, and has distributed the circulars received from the State Board, all of which has had a tendency to make the people more careful.

#### LITTLETON.

Members of the board: Henry A. Hall, one year; G. C. Hayward, two years, Chairman; L. F. Hall, three years, Secretary.



We have had one case of diphtheria and in this case the board ascertained that all necessary precautions were taken.

#### LIVERMORE.

Members of the board: R. B. Bradford, one year; Eli Edgecomb, M. D., two years, Chairman; W. F. Fuller, three years, Secretary.

We have had no contagious diseases, excepting one mild case of typhoid fever, probably caused by unsanitary condition around the dwelling. Only one nuisance was reported to the board and this was promptly removed by the person who was at fault when requested to do so by the board.

#### LOVELL.

Members of the board: Rev. Jos. W. Webster, one year; C. P. Hubbard, M. D., two years, Secretary; Isaac Chandler, M. D., three years, Chairman.

We had one case of scarlet fever and two of typhoid fever. We have taken the proper precautions in every case of the contagious diseases. A fatal case of poisoning in a child occurred from eating Paris green.

#### LUBEC.

Members of the board: A. B. Sumner, one year, Secretary; Jas. B. Neagle, two years; I. W. Hamilton, three years, Chairman.

No report received.

#### MACHIAS.

Members of the board: Henry H. Smith, M. D., one year, Secretary; Sam'l B. Hunter, two years; Thos. P. Hutchins, Esq., three years, Chairman.

We have had four cases of diphtheria, thirty-five of scarlet fever, and three of typhoid fever. Two of the scarlet fever cases proved fatal. The scarlet fever was introduced by a family coming from Boston with a child in the desquamative stage. We did not find it out until the disease had spread to a considerable extent. Immediate isolation of cases of contagious diseases and of all persons having anything to do with the patients has been carried out.

#### MACHIASPORT.

Members of the board: I. M. Bouns, one year, Health Officer; Chas. W. Gates, two years, Secretary; J. J. Drisko, three years, Chairman.

No report received.

MADAWASKA.

Members of the board: J. C. Morneault, one year; Luke Albert, two years; Mitchel Martin, three years; Arthur Daigle, Secretary. No report received.

MADISON.

Members of the board: Z. Dinsmore, one year; W. G. Sawyer, M. D., two years, Chairman; J. F. Chadbourne, three years, Secretary.

Complaints have been received from various sources in relation to sink spouts, privies, etc., and these have been investigated and suggestions made. Four cases of diphtheria have been reported to the board, and isolation, disinfection and other precautionary measures were taken. All the cases recovered with no spreading of the disease from the sick to other persons. We have also had three cases of typhoid fever and measles has been prevalent.

MADRID.

Members of the board: B. C. Powers, one year, Secretary; J. L. Witham, two years; A. J. Hewey, three years, Chairman.

No cases of the contagious diseases have appeared.

MANCHESTER.

Members of the board: F. J. Hewins, one year; G. M. Knowles, two years, Secretary; W. R. Merrill, three years, Chairman.

Two nuisances were reported to the board. They were removed. We have had one fatal case of diphtheria.

MAPLETON.

Members of the board: J. A. Stewart, one year, Chairman; J. C. Chandler, two years, Secretary; Alexander J. Alley, three years.

Four nuisances were reported to the board, and were disposed of without trouble. There has been one case of diphtheria and four of typhoid fever. Cases of nuisance and of contagious diseases that have been reported to the board have been promptly attended to.

MARIAVILLE.

Members of the board: E. J. Morrison, one year; E. G. Brimmer, two years, Secretary; Molbory Kingman, three years.

No cases of infectious diseases have invaded the town.

## MARION.

Members of the board: F. N. Gardner, one year; Jos. Thompson, two years, Chairman; Benj. L. Smith, three years, Secretary.  
No special cases have called for work from the board.

## MARSHFIELD.

Members of the board: M. S. Getchell, one year, Health Officer; D. W. Holmes, two years, Secretary; L. B. Thaxter, three years, Chairman.

We have had no cases of infectious diseases.

## MARS HILL.

Members of the board: H. W. Safford, one year, Chairman; F. L. Keay, two years, Secretary; J. H. Syphers, M. D., three years, Health Officer.

One nuisance which was promptly removed, and looking after one case of typhoid fever, has been all the special work which has come before the board.

## MASARDIS.

Members of the board: F. W. E. Goss, one year, Chairman; S. W. Clark, two years, Health Officer; F. H. Knowlen, three years, Secretary.

One nuisance was promptly removed upon notification from the board. There have been no cases of the infectious diseases.

## MASON.

Members of the board: C. F. Brown, one year, Chairman; H. G. Mason, two years; Rev. A. H. Witham, three years, Secretary.

We have had no cases of the infectious diseases.

## MATTAMISCONTIS

Members of the board: W. P. Roberts, one year; E. E. Roberts, two years, Chairman; Wm. G. Sawyer, Secretary.

No report received.

## MATTAWAMKEAG.

Members of the board: Geo. W. Smith, Secretary; Jas. H. Hamilton, Chairman; Alexander McLeod.

We have had no cases of the contagious diseases.

## MAXFIELD.

Members of the board: C. J. Cummings, one year, Secretary; John Smart, two years, Chairman; Geo. Emery, three years.

At the time of making this report, measles is prevalent to some extent; otherwise than this we have been quite fortunate in escaping all other contagious diseases.

## MEDDYBEMPS.

Members of the board: J. S. Bridges, one year, Secretary; S. J. Allen, two years; Chas. L. Hatter, three years, Chairman.

One nuisance ordered removed by this board was partially remedied. We have had two fatal cases of diphtheria.

## MEDFORD.

Members of the board: W. S. Lovejoy, one year, Chairman; A. A. Bailey, two years, Secretary; S. O. Dinsmore, three years.

No special work came to the local board excepting the preventive management of one case of typhoid fever.

## MEDWAY.

Members of the board: Thomas Fowler, one year, Chairman; W. H. York, two years; C. A. DeGrass, three years, Secretary and Health Officer.

Three cases of nuisance were reported to the board and these presented no difficulty in removal. Measles has been prevalent but no other contagious diseases have been reported to the board.

## MERCER.

Members of the board: Eli Wells, one year; D. G. Wood, two years, Secretary; John Bunker, three years, Chairman.

We have been very free from diseases. In one case of typhoid fever which occurred we saw that proper precautions were taken.

## MEXICO.

J. O. Kidder, one year; L. C. Willoughby, two years, Chairman; H. J. Binford, M. D., three years, Secretary.

No report received.

## MILLBRIDGE.

Members of the board ; Rufus Fickett, one year, Chairman ; Geo. A. Sawyer, M. D., two years ; Geo. Googins, M. D., three years, Secretary.

The village is supplied with water brought by an aqueduct from springs which are more than a mile distant. The water is good and pure. Five nuisances were reported to the board and removed. We had two cases of diphtheria, three of scarlet fever, and one of typhoid. Fevers have been less prevalent than usual and the same may be said of the so-called summer complaints. We think this is owing in great measure to better water and more careful sanitary regulations.

## MILFORD.

Members of the board : M. A. Austin, one year, Chairman ; M. W. Sawyer, two years, Secretary ; F. P. Oliver, three years, Health Officer.

No cases of the contagious diseases have been present.

## MILO.

Members of the board : M. L. Durgin, Jr., one year, Chairman ; H. Hamlin, M. D., two years ; A. W. Murray, three years, Secretary.

Four nuisances were reported to the board. Three of these were removed, and one was in part and this one will be further improved before warm weather returns. We had one case of diphtheria. There has been no special prevalence of any disease.

## MINOT.

Members of the board : Chas. A. True, one year, Chairman, H. C. Bray, two years ; C. H. Tobie, M. D., three years, Secretary.

We have had eleven cases of scarlet fever and nine of typhoid fever, none of which proved fatal.

There have been four complaints of nuisances made to the board and all these cases were attended to. Other sanitary work has been done voluntarily by the board.

## MONMOUTH.

Members of the board : Jesse Jeffrey, Esq., one year, Chairman ; H. O. Pierce, two years ; D. E. Marston, M. D., three years, Secretary.

There has been but little sickness in the town and no cases of the infectious diseases.

#### MONROE.

Members of the board: Freeman Atwood, one year, Chairman; E. H. Neally, two years; J. J. Sewall, M. D., three years, Secretary.

The village has one sewer running through a portion of the principal street and discharging into the stream back of the village. Two complaints have been made of nuisances and these were promptly investigated and removed.

We have had seven cases of typhoid fever, two of which proved fatal. We have no specially unhealthy places. For neatness and cleanliness no village can surpass ours. Come and see us.

#### MONSON.

Members of the board: Geo. F. Jackson, one year, Chairman; F. J. Wilkins, two years; Eli R. Haynes, three years, Secretary; Crowell C. Hall, M. D., Health Officer.

No report received.

#### MONTICELLO.

Members of the board: M. J. Hogan, one year, Chairman; I. M. Hill, two years, Secretary; Enoch Robertson, three years; J. A. Kilburn, M. D., Health Officer.

No report received.

#### MONTVILLE.

Members of the board: A. D. Ramsey, M. D., one year, Secretary; C. T. Randall, two years; B. F. Foster, three years.

We have had no cases of the contagious diseases. One case of arsenical poisoning occurred.

#### MORRILL.

Members of the board: J. R. Mears, one year, Chairman; D. O. Bowen, two years; J. W. Pearson, M. D., three years, Secretary and Health Officer.

The absence of contagious diseases has rendered special work unnecessary.

#### MOSCOW.

Members of the board: C. M. Hill, one year; Thomas Emerton, two years, Chairman; Albert Burke, three years, Secretary.

None of the specified diseases have visited the town, but we had five cases of measles.

This town is well supplied with springs of pure water. In some places where there are no springs wells are sunk, and I have noticed that some of these are badly located, being placed below the buildings and receiving the drainage of the sink spout and the privy, and the people suffer more or less from this cause. No nuisances have been reported to this board, but doubtless there are plenty of them in town.

#### MOUNT CHASE.

Members of the board: A. A. Cooper, Secretary; Frederick French; Lowell M. Davis, Chairman.

No report received.

#### MOUNT DESERT.

Members of the board: S. N. Nash, one year, Secretary; W. S. Smallidge, two years; B. T. Atherton, three years, Chairman.

One nuisance reported and properly attended to. We have had no cases of the infectious diseases.

#### MOUNT VERNON.

Members of the board: R. F. Fletcher, one year, Chairman; Jas. A. Robinson, two years; Silas Burbank, M. D., three years, Secretary.

We have had five cases of typhoid fever but no deaths resulted. Cases of the contagious diseases are attended to at once and one nuisance which was reported to the board was removed.

#### NAPLES.

Members of the board: Geo. W. Hall, Chairman; Chas. Y. Lord, M. D.; Philip O. Cannel, Secretary.

Eight nuisances were reported to the board but none of them were of unusual character. There has been one case of typhoid fever. The patient was isolated at once.

#### NEWBURG.

Members of the board: C. H. Whitcomb, one year, Secretary; D. B. Newcomb, two years, Chairman; F. O. J. S. Hill, three years.

We have had nine cases of diphtheria with two deaths and seven cases of typhoid fever with one death. The cases of the contagious diseases are attended to promptly.

#### NEWCASTLE.

Members of the board: J. G. Barstow, one year; A. W. Glidden, two years, Secretary; R. C. Chapman, three years, Chairman.

Three cases of typhoid fever have occurred. The doctor reports that one of the cases was caused by impure drinking water.

#### NEWFIELD.

Members of the board: T. E. Mitchell, one year, Chairman; C. L. Wentworth, two years, Secretary; I. M. Trafton, M. D., three years.

No cases of the contagious diseases have occurred.

#### NEW GLOUCESTER.

Members of the board: H. M. Harmon, one year, Secretary; Alvin Brown, two years; J. I. Sturgis, M. D., three years, Chairman.

One nuisance was reported and removed. Two cases of diphtheria and three of scarlet fever have occurred. When a case of contagious disease occurs the house is visited at once and a card of warning is placed on the door and the family are advised in regard to sanitary precautions. The teachers are also notified and disinfection of the house is secured. The board has sharply looked after all cases, and if we had not I think we should have had a long run of scarlet fever. As it was, we kept it within the walls of one house.

The circumstances connected with the origin of our two cases of diphtheria are somewhat singular; both cases seemed to have their starting point in a certain school-room. In this school-room two years ago or more a boy was taken down with diphtheria. The seat which this boy occupied was not used again until last spring, when it was taken by a little boy who was soon taken down with diphtheria. That was our first case. The seat was cleansed and remained idle until this winter term, when a boy occupied it again and soon he was taken down with diphtheria. This was the second of the two cases which I report. It would seem as though that seat had



been infected by the first case and was the origin of our two cases of this year.

#### NEW LIMERICK.

Members of the board: Ellsworth Lougee, one year, Secretary; John Mullen, two years, Chairman; S. C. Spratt, three years.

No report received.

#### NEWPORT.

Members of the board: R. H. Libbey, one year, Chairman; A. I. Harvey, M. D., two years, Health Officer; F. M. Shaw, three years, Secretary.

One nuisance was abated by the board. No contagious diseases have occurred, except one case of typhoid fever.

#### NEW PORTLAND.

Members of the board: Abiel Thompson, one year; S. A. Bennett, M. D., Chairman; W. H. Stevens, M. D., three years, Secretary.

One nuisance was abated by the board. One case of typhoid fever occurred, and chicken-pox was prevalent in the north village. It would be better if more care were taken as regards wells, privies, and sink slops.

#### NEWRY.

Members of the board: Nathaniel Trask, one year, Chairman; F. C. Kilgore, two years, Secretary; C. H. L. Powers, three years.

We have had four cases of typhoid fever, but no deaths.

The cases of typhoid fever reported were caused by polluted water. The well is situated at the back part of the kitchen, in one corner. The well is thirty feet deep. Back of the house is a large hollow, all of the land sloping toward it. Situated about twelve feet from the well is the privy, and some seventy feet further away is the cow yard. The drainage from this flows through this hollow, and as there is no place for it to flow out, it of course sinks into the ground, and, being but a short distance from the well, must flow into it, as does also the drainage from the privy, as it flows into this same hollow. Even if it did not, the nearness to the well would be source enough for the disease.

## NEW SHARON.

Members of the board: Nathaniel Harding, one year, Chairman; Chas. E. Gordon, two years; Daniel R. Hargraves, three years, Secretary.

Two nuisances were removed. Other cases were reported to the board, but the responsible parties learning of the fact promptly removed them without waiting for us to notify them. Two cases of typhoid fever have occurred. The place where the first case began was the starting point of typhoid fever several years ago when it went through our village.

The ventilation of our school-houses is not good. The outhouses, as a rule, are filthy and some of them have not been cleaned for years.

## NEW SWEDEN.

Members of the board: E. Ringdahl, one year; E. M. Lundvall, two years, Secretary; O. P. Fogelin, three years, Chairman.

No special work has been done by the board during the year, because the place has been perfectly healthy.

## NEW VINEYARD.

Members of the board: S. B. Luce, one year, Secretary; E. S. Voter, two years, Chairman; A. J. Barker, three years.

No cases of the contagious diseases have occurred.

## NOBLEBORO'.

Members of the board: Wm. H. Moody, one year; Jas. Mulligan, two years, Chairman; John M. Winslow, three years, Secretary.

One nuisance was removed by the board. Two cases of typhoid fever occurred, one of which was fatal.

## NORRIDGEWOCK.

Members of the board: C. A. Harrington, Esq., one year, Chairman; Henry Murphy, two years; F. E. Varney, M. D., Secretary.

No report received.

## NORTH BERWICK.

Members of the board: S. A. Nash, M. D., one year, Chairman; F. B. Morrill, M. D., two years; J. O. McCarrison, M. D., Secretary.

Some ten or twelve nuisances have been reported to the board. The most of these have been abated or entirely overcome.

We have had nine cases of diphtheria with one death, one case of scarlet fever, and ten cases of typhoid fever with one death. We had a severe epidemic of measles in the spring and again in the fall. The disease was complicated with lung and pleural difficulties. The directions of the State Board of Health have been fully carried out as regards the infectious diseases. Isolation of patients and infected houses and thorough disinfection have been done.

Since the formation of the local board nearly every house in the village has been visited and a thorough inspection of the premises made. Many faults were discovered, and in the great majority of cases all the changes recommended have been quite cheerfully made.

The outhouses in connection with the village schools have been remodelled and placed in a proper sanitary condition. The system of isolation which has been carried out in all cases of infectious diseases excepting measles has been very effective in preventing the spread of the infection. Still there is work to do. With a better understanding of the objects of the local board of health by the people, and a better understanding of the requirements of the State Board by the members of the local board, the coming year will show a greater unity of work and more valuable results.

#### NORTHFIELD.

Members of the board: G. B. Smith, one year, Chairman; C. B. Albee, two years; A. J. Harmon, three years, Secretary.

Seven cases of scarlet fever have occurred. The first two cases cannot be accounted for, as they appeared in different families three miles apart, and the children had not been away from home. Cases of the infectious diseases were isolated as soon as discovered.

#### NORTH HAVEN.

Members of the board: Nelson Mullen, one year; B. C. Calderwood, two years, Secretary; A. G. Beverage, three years, Chairman.

There have been no cases of the infectious diseases, excepting a mild rash, thought to be canker rash, but so mild that no action was taken. When diphtheria occurred in Vinalhaven, the board took action to prevent the introduction of the disease from that town.

## NORTHPORT.

Members of the board: J. R. Hurd, one year; F. A. Rhoades, two years, Chairman; M. C. Hill, three years, Secretary.

Our work has been principally in trying to secure a better sanitary condition among our numerous summer cottagers who are heartily in sympathy with us. We feel a great interest in the work which you are doing and are willing to do what we can to make the work a success locally.

Two cases of non-fatal typhoid fever occurred, but no other infectious diseases.

## NORTH YARMOUTH.

Members of the board: Chas. W. Mountfort, one year, Secretary; Noah Jewett, two years, Chairman; Wm. Osgood, M. D., three years, Health Officer.

One nuisance was reported to the board and this was removed. We have had eight cases of scarlet fever and four of typhoid fever, with one death from the latter disease. The first case of scarlet fever was imported and was not recognized as such by the family. It was discovered by the health officer after it had invaded a second family which had been exposed to the contagion in the first family. When we have had cases of the infectious diseases, the houses have been visited and directions have been given for disinfection, and disinfectants have been supplied.

## NORWAY.

Members of the board: A. B. Chase, one year; H. E. Mixer, two years, Chairman; E. F. Smith, three years, Secretary; G. W. Brown, M. D., Health Officer.

Two complaints of nuisances were received. These were abated. We have had one case of fatal diphtheria. Special local causes of unhealthfulness are Pennesseewassee River and Shallow Brook. What we need is a sewerage system, well planned and well built.

Two deaths occurred from drowning. Hog cholera has been prevalent among swine.

After the organization of the board and the adoption of by-laws every part of the village and town was visited and its conditions as regards healthfulness were inspected. When unsanitary conditions were found the attention of the owners was called to them.

This resulted in a general clearing up. In all our endeavors we have found a hearty co-operation on the part of the citizens. While the doings of the board thus far have been limited, owing as much as anything to the newness of the work, a beginning has been made.

#### OAKLAND.

Members of the board: W. S. Holmes, M. D., one year, Health Officer; H. W. Wells, two years, Secretary; Geo. W. Hubbard, three years, Chairman.

Two nuisances have been removed by the board. There have been three cases of diphtheria and one of typhoid fever. These were mild and all the cases recovered.

#### OLD ORCHARD.

Members of the board: Jas. H. Ricker, one year; Gilbert Wiley, two years, Chairman; Wesley G. Smith, three years, Secretary.

In the immediate future we are to have a system of water works taking its supply from a natural spring three miles from the center of distribution and half a mile from any human habitation. The present supply comes from a spring and is distributed by a log aqueduct. Most of the nuisances which have been reported and abated have been ill-kept privies. Last season we arranged with the municipal officers to have the town team three days each week for the purpose of collecting waste and rubbish during the boarding season. This was unanimously appreciated. We have had no cases of infectious diseases, excepting three cases of typhoid fever which recovered. These cases were not local as to origin.

The best suggestion which I can make for improving the sanitary condition of the place is—*vigilance*.

#### OLDTOWN.

Members of the board: A. H. Maddocks, one year, Secretary; Artemus Rigby, two years, Chairman; Caleb P. Parker, three years.

We have no sewerage system.

The number of nuisances reported to this board which were of much account, was seven; six of these were removed. An old canal which passes through the village of Upper Stillwater has not been used for some time and has become obstructed by a railroad and by

mill owners and others. In the summer the stagnant, stinking water makes quite a nuisance.

We have had nineteen cases of scarlet fever, six of typhoid fever, and measles has been prevalent.

A certain street between Oldtown village and Great Works village seems to be a breeding place for typhoid fever, caused probably by low marshy ground in the rear of the dwellings and the unclean condition of some of them and their out-buildings.

#### ORIENT.

Joel Faulkner, one year ; Jas. Estabrooke, two years, Health Officer ; Wm. H. McAllister, three years, Secretary and Chairman.

One nuisance has been removed at the request of the board. We have had no cases of the infectious diseases.

#### ORLAND.

Members of the board : Daniel Thurston, one year, Secretary ; Henry Partridge, two years, Chairman ; Frank P. Perry, M. D., three years, Health Officer.

We have had eleven cases of diphtheria with four deaths. One nuisance was removed.

#### ORNEVILLE.

Members of the board : M. W. Morgan, one year ; F. W. Canney, two years, Chairman ; A. C. Cushman, three years, Secretary.

Of the specified infectious diseases we have had only one case of typhoid fever.

#### ORONO.

Members of the board : Wm. C. Taylor, one year ; J. H. Knox, M. D., two years, Chairman and Health Officer ; Chas. P. Crowell, three years, Secretary.

Four nuisances were reported to the board and all of them were removed. We have had two cases of diphtheria with one death, and two cases of scarlet fever which recovered. Cases of the infectious diseases have been isolated.

#### ORRINGTON.

Members of the board : Sumner Chapin, one year ; A. N. Lufkin, two years, Chairman ; Geo. B. Tibbetts, M. D., three years, Secretary.

We have had one case of scarlet fever and six of typhoid fever. Isolation and disinfection have been practised in connection with the infectious diseases. Two of the cases of typhoid fever seemed to have been caused by drinking river water while on coasting vessels.

#### OTIS.

Members of the board: Leslie W. Fogg, one year, Secretary; W. W. Tibbetts, two years; Jason R. Grant, three years, Chairman.

No cases of infectious diseases have occurred.

#### OXFORD.

Members of the board: A. L. Hersey, M. D., one year; E. V. Walker, two years, Chairman; W. E. Holmes, three years, Secretary.

Two nuisances were reported and removed. One case of diphtheria and five of typhoid fever have occurred with one death from the latter disease. We have isolated our cases of infectious diseases and confined the disease to the place of its origin. We need a good water supply.

Four of the cases of typhoid fever occurred in one house. They appeared to have been caused by the unsanitary surroundings. There was no cellar drain and a foot of water stood in the cellar. The board ordered the removal of the family at the earliest possible time. A foot of mud was taken from the bottom of the cellar, a good drain was opened, and the outbuildings and the sink drain were thoroughly renovated. The case which terminated fatally was that of a feeble eight-years-old child. The fever culminated in tubercular meningitis.

There were several children in the house where the case of diphtheria occurred, but the patient was kept isolated in a well ventilated room and a free use was made of disinfectants. None were admitted to the room but the attendants, and none of the other members of the family contracted the disease.

#### PALERMO.

Members of the board: P. S. Worthing, one year; M. Delany, M. D., two years, Secretary; L. E. Pierce, three years, Chairman. No report received.

## PALMYRA.

Members of the board: Geo. W. Hanson, one year; J. B. Chase, two years, Chairman; Lewis Wyman, three years, Secretary.

Since the organization of this board there have been eleven cases of typhoid fever in town, all of which recovered. When cases of the infectious diseases have come to our knowledge the families have been promptly visited, advised with, and they have been furnished with the circulars for the prevention of the disease.

## PARIS.

Members of the board: Isaac Rounds, M. D., Chairman; O. K. Yates, M. D., Secretary; Jas. S. Wright, Esq.

We have had no cases of the infectious diseases, excepting seven of typhoid fever with one death.

After the organization of our board we gave notice to the inhabitants that we should require all house drainage, privy vaults and similar places to be put in a proper condition before the first of June. Our citizens responded very kindly to the notice, and by the first of June a marked improvement was made in the sanitary condition of our town. In July we made a personal inspection of the condition of our villages and whenever we found premises in an unhealthful condition the owners were requested to remove the nuisances.

All of the parties had the places cleaned up to the satisfaction of the board within the specified time.

## PARKMAN.

Members of the board: J. C. Butterfield, M. D., Secretary and Health Officer; Chas. Morrill, two years; Ireson Briggs, three years, Chairman.

No report received.

## PARSONSFIELD.

Members of the board: Ivory Fenderson, one year, Chairman; John G. Lombard, two years; Silas A. McDaniel, three years, Secretary.

We have had no cases of the infectious diseases.

The board has endeavored to enlighten the public in regard to the benefit to be derived from the observance of the public health laws, and to secure their co-operation. We have given information rela-



tive to disinfectants, drinking water, ventilation, etc. More can be done next year. I think the surest way to reach the public would be to have hygienic laws more generally taught in our public schools. I would suggest that "Easy Lessons" be furnished by the State to every country school for instruction. The lessons should be within the comprehension of the ordinary common school scholar. The text books on physiology hardly ever reach lower than the high school.

## PATTEN.

Members of the board: Leroy Miles, one year, Chairman; F. F. Bigelow, M. D. two years, Secretary; Benj. C. Woodbury, M. D., three years.

We had two mild cases of diphtheria which we isolated at once. We need a careful personal inspection of the village as regards water supply, privies, cellars, etc.

## PEMBROKE.

Members of the board: C. W. Hersey, one year; Wm. E. Leighton, two years, Secretary; J. C. Rogers, M. D., three years, Chairman.

We have had no cases of the infectious diseases excepting one fatal case of diphtheria. In this case precautions were taken to prevent the extension of the disease.

## PENOBSCOT.

Members of the board: J. B. Snowman, one year, Chairman; B. H. Wardwell, two years; E. A. Sprague, M. D., three years, Secretary and Health Officer.

We have had twenty cases of well-defined diphtheria with three deaths, and one fatal case of typhoid fever.

It is too true that while our cities and larger towns are all the time improving their sanitary condition, our conditions in the rural districts are naturally becoming worse. While they are supplying themselves with good pure water, our supplies are in constant danger of being contaminated by the causes of pollution around them.

## PERKINS.

Members of the board: B. F. Curtis, one year, Chairman; G. W. Call, two years, Secretary; Thomas Hinkley, three years.

We have had no cases of the contagious diseases. We have had no work to do our town is so small, there being only seventeen families in it.

#### PERU.

Members of the board: A. B. Walker, Secretary; Otis Wyman; Wm. S. Walker, Chairman.

We have had no cases of the infectious diseases. One nuisance was removed by the board.

#### PHILLIPS.

Members of the board: H. B. Palmer, M. D., one year, Secretary; W. A. D. Cragin, two years; C. M. Davis, three years, Chairman.

We have had two cases of scarlet fever and one of typhoid fever but no deaths from either of these diseases. Two nuisances were abated by the board.

#### PHIPPSBURG.

Members of the board: F. J. Parks, one year, Chairman; M. B. Spinney, two years; M. H. Ferguson, three years, Secretary.

No report received.

#### PITTSFIELD.

Members of the board: H. C. Pooler, one year, Chairman; D. M. Parks, two years; Truman M. Griffin, M. D., three years, Secretary.

We have a fair system of sewerage in the village. Thirteen nuisances have been reported to the board and the most of these have been removed and the remaining ones have been made less offensive. We have had eight cases each of diphtheria, scarlet fever and typhoid fever. Two deaths resulted from typhoid fever. Prompt action has been taken in cases of the contagious diseases to suppress the contagion by isolation, disinfection, etc. One case of drowning occurred.

One case of typhoid fever resulted from drinking from a brook which ran a few feet back of a house in which typhoid fever was prevailing.

#### PITTSTON.

Members of the board: J. E. Jewett, one year, Secretary; E. A. Lapham, two years, Chairman; C. C. Libby, M. D., three years, Health Officer.

No report received.

## PLYMOUTH.

Members of the board: John F. Longley, one year, Chairman; Moses J. Dow, two years; L. A. Cook, three years, Secretary.

On account of the death of Dr. Prescott, the former secretary of the board, the present secretary is not able to make a full report. During the two months since his election to the office there have occurred two cases of typhoid fever, with one death.

## POLAND.

Members of the board: E. F. Bradford, M. D., one year, Secretary; B. M. Fernald, two years; A. S. Littlefield, Esq., three years, Chairman;

Six or eight nuisances consisting of ill-kept privies have been reported to this board and an improvement in their condition made by order of the board.

We have had eight cases of diphtheria, nine of scarlet fever, and six of typhoid fever. One death occurred from diphtheria. The most important thing in this village from a sanitary point of view is the danger of small-pox from rags brought here from American cities. There have been no less than four such outbreaks during my nineteen years of residence here. Six or eight persons, I think, have died from this cause. Vaccination is not practiced among the employees as it should be.

## PORTER.

Members of the board: Warren Libby, one year, Secretary; John B. Danforth, two years; Daniel D. Ridlon, three years, Chairman.

We have had one case of scarlet fever and two mild cases of typhoid fever, no deaths occurring.

In the case of scarlet fever the patient was strictly isolated, all other persons being excluded excepting the necessary attendants. The disease was confined to the single case, although there was another child in the same house. Much credit is due for these good results, first, to the persons in the household who had the charge of the patient, and secondly, to the attending physician who assured himself that every possible precautionary measure was observed.

## PORTLAND.

Members of the board: A. K. P. Meserve, M. D., one year; C. D. Smith, M. D., two years, Chairman; Geo. C. Burgess, three years, Secretary.

The blank sent from the office of the State board of health calls for a report "for the year beginning January 1, 1887," but the members of this board did not receive their appointment until April 11th, 1887, on which date it organized. It is possible, on our part, to give statistics covering the whole of the year by using the records of our predecessors, but as comparisons will be made in the published reports of the State board, it seems but fair to state the fact that our operations cover twelve months while other cities and towns in which no local board existed until the passage of the present law, can report, at most but eight months' work or cases of contagious diseases and nuisances within the same length of time.

The principal water supply of the city is from Lake Sebago; there are however many wells in the eastern and middle sections of the city, still in use.

Two persons are licensed to remove night-soil. Covered carts are used to convey this out of the city where it is, for the most part, composted for use by farmers. The service is quite unsatisfactory and this board recommend that the collection be made in the day time and in sealed barrels or an odorless excavator.

We have a system of sewerage consisting of underground vitrified or cement pipes. The city engineer is superintendent of sewers. In isolated houses the drains discharge into cess-pools, rarely upon the surface. It is estimated that about five miles of our fifty miles of streets are unsewered. The city built, the present year about two and one-half miles of sewers.

So far as mere figures may do so, the following tabulation of the inspector's monthly reports shows the character and amount of the work done:

No. of privy vaults in bad condition, ordered cleansed...	1,108
overflowing vaults.....	26
privy vaults found in good condition.....	372
cellars found in good condition.....	914
“ “ bad “ .....	481

No. water closets inspected during the year. ....	633
“ “ good condition .....	500
“ “ bad “ ordered fixed.....	133
swine removed.. ..	21
new privy vaults built, no sewer in street.....	19
vaults ordered removed, water closets built . . . . .	146
Sink drains, rubbish piles, accumulations of filth, ordered remedied .....	1,030
Sink drains found in good order.....	812
Sinks without traps, ordered fixed.....	263
Yards in good condition .....	646
Overflowing cess-pools.....	17
Visits on account of contagious diseases (October, November and December)....	257
Formal complaints received. . . . .	960
No. visits made not classified, principally to see that orders were being carried out properly.....	1,882
stagnant pools filled .....	12
city culverts ordered cleansed. ....	13

The yards, sink-drains, cellars, &c., found in good condition are from our house to house inspections. You will see from this report that our inspector has been a very busy man, and we are glad to report that such is his efficiency that we have had absolutely no trouble in enforcing our decisions and no difficulty in securing an abatement of nuisances.

The number of vaults, cellars, sink-drains, etc., reported found in good condition is the result of the house to house inspection, while the large number of vaults, sink-drains, etc., found in bad condition is the result of complaints made, as well as the house to house inspection.

The ignorance or indifference of the general public with regard to proper hygienic conditions is simply deplorable. People appear to be perfectly satisfied to live over damp and wet cellars in which more or less decaying material is kept, unmindful that through the cellar most of the air must come which supplies their living rooms for the larger part of the year; broken drains, untrapped sink and water closet pipes; drains clogged and overflowing, privy vaults beneath the house roofs, uncleansed for a number of years, foul yards, through which rain and melted snow percolate beneath their houses; all these things and others in addition, do not appear to be

otherwise than the correct thing, in the minds of many whose natural instincts if not their education, should teach them better.

The new health law requires house-holders and physicians to report to the Board of Health, all cases of small-pox, diphtheria, scarlet fever, cholera, typhus or typhoid fever, but as the physicians of this city had been making such reports since September, 1886, we are able to cover the whole ground of one year in this report.

There have been reported to the Board for the year ending Dec. 31st, 1887, the following cases :

Diphtheria. ....	128
Scarlet fever. ....	64
Typhoid fever. ....	80

No cases of small pox, cholera or typhus fever were reported.

The number of deaths from the above diseases were as follows :—

Diphtheria. ....	34
Scarlet fever. ....	7
Typhoid fever. . . . .	8

In the month of May, what appeared to be an epidemic suddenly appeared, sixteen cases having been reported to the board of what was at first suspected to be typhus fever, on account of anomalous symptoms. It was however soon determined to be typhoid fever; two cases proved fatal and a *post mortem* confirmed this diagnosis. These cases all came from the steamship Prussian, which landed 600 passengers at Boston, where within forty-eight hours thirty-five cases were reported to the board of health there, and sent to various hospitals. The same uncertainty prevailed there as to the nature of the disease.

So far as could be ascertained all passengers by that steamship who came to Portland were taken sick here. We do not know of its spreading to other persons.

Through the cordial co-operation of all the physicians, early report is made to the board of any case of contagious disease. The secretary immediately makes out a report of the case for the information of the schools, one on a card especially intended for the superintendent of schools, the other on State blank form 3, that teachers may know the law relating to the case; these cards are handed to the truant officer, who calls at the Secretary's office twice a day for that purpose. The health inspector is informed of the case and he at once goes to the house where the case is reported and puts at front and rear entrances a card stating that diphtheria, or scarlet

fever, as the case may be, exists in said house. He also leaves with the family the State circular relating to the particular disease which has been reported, and form 38, relating to disinfectants and their use. Should the case be one of peculiar malignancy or noticeable from any other cause, the board is kept informed of its progress by the inspector or physician and precautionary measures taken accordingly.

At the termination of the case the board is informed what measures of disinfection have been taken, and in cases where parties have been unable to perform this duty, the board has furnished materials and a proper person to do the work.

No objection is made by householders to the affixing of the card. On the contrary they express themselves glad to be relieved of the responsibility of giving notice of the disease.

We have not during the year, met with any opposition to the orders which the board has issued.

#### POWNAL.

Members of the board: S. A. Vosmus, M. D., one year, Secretary; Moses Plummer, Esq., two years, Chairman; I. T. McIntire, three years.

No cases of the infectious diseases have appeared.

#### PRENTISS.

Members of the board: Thos. Butterfield, one year, Secretary; E. E. Butters, two years, Chairman; J. T. Belden, three years.

No report received.

#### PRESQUE ISLE.

Members of the board: C. P. Allen, Esq., one year, Chairman; F. Kilburn, M. D., two years, Secretary; G. H. Freeman, M. D., three years.

The principal water supply of the village is derived from a small stream which has its source in a number of springs of high elevation and located in coarse sandy soil. The water is clear through the year, excepting a little turbidity during the spring freshets. The reservoir is situated ninety feet above the site of the town and a mile from the center of the village. The water is conducted through eight-inch iron mains.

Until within the past year only the common privy system of disposal of excreta has been in use. During the past summer and autumn we started a sewer, laying down fourteen hundred feet of six-inch main passing through the most thickly settled and unhealthy part of the village. Two nuisances were removed by the board.

We have had two cases of diphtheria with one death, and two cases of typhoid fever, both recovering.

The board has visited all parts of the village suspected to be unsanitary, either from complaint or from knowledge obtained otherwise. We have had about twenty privy vaults and sink drains removed, and water closets substituted, and have had cellars and yards thoroughly cleaned and disinfected.

#### PRINCETON.

Members of the board: C. Flower, M. D., one year, Chairman; S. G. Spooner, M. D., two years, Secretary; Jas. Spencer, three years.

We have had a few cases of typhoid fever from which two deaths have occurred. During the year there has been a prevalence of a fever resembling cerebro-spinal meningitis which was quite severe in the fall and still prevails to some extent, but it does not appear to be due to unsanitary conditions.

#### PROSPECT.

Members of the board: Gooding Grant, one year, Chairman; Capt. G. W. Dow, two years; J. H. Littlefield, three years, Secretary.

We have had no cases of the infectious diseases, excepting one case which was reported as diphtheria. One scholar in the village school was taken with what appeared to be diphtheria and the school was dismissed and the school-room disinfected and fumigated. The disease, however, proved to be tonsillitis.

#### RANDOLPH.

Members of the board: Benj. Clark, one year; B. A. Cox, two years, Secretary and Health Officer; Albert White, three years, Chairman.

Two nuisances were abated by the board. No cases of the infectious diseases have been reported or known. There are some localities in which we might expect contagious diseases to get a foot-



hold, but this year they have not. One of these places is where tenement houses are placed near together and where their sink drains empty into hogsheads set in the ground and in some cases under the ell of the house. Another place is where a brook running through the village has several privies over it and in the summer the brook is dry.

#### RANGELEY.

Members of the board: Daniel Howe, one year; J. A. Burke, Esq., two years, Chairman; S. A. Ross, M. D., three years, Secretary.

No cases of the infectious diseases have occurred.

#### RAYMOND.

Members of the board: Alfred Wilson, one year, Chairman; B. S. Smith, two years; L. H. Jordan, M. D., three years, Secretary.

We have had three cases of diphtheria and one case of typhoid fever; no deaths from either disease. In connection with the cases of contagious diseases all the necessary precautions have been carried out.

In one of the above cases of diphtheria, the patient, an elderly lady who was in feeble health, had been visited about five days before her attack by a grandchild just recovering from an attack of sore throat which the attending physician did not think was diphtheria. In my opinion, however, the disease was communicated by the child.

#### READFIELD.

Members of the board: E. S. Hannaford, M. D., one year; W. A. Wright, M. D., two years, Secretary; Prof. W. C. Strong, three years, Chairman.

Four nuisances have been reported to the board and all were removed. No cases of the infectious diseases have occurred.

#### RICHMOND.

Members of the board: Chas. H. Hodges, one year; Chas. D. Newell, two years, Chairman; Geo. P. Emmons, M. D., three years, Secretary.

Five nuisances have been reported to the board and eight have been removed. Many things have come under the direct observance

of the board individually and on mentioning the matter to those at fault the defect has been remedied without further trouble.

We have had one case of diphtheria and three of typhoid fever. In connection with cases of the contagious diseases immediate action has been taken and the instructions received from the State Board have been carried out.

#### RIPLEY.

Members of the board: A. R. Dunlap, one year, Chairman; E. H. Ramsdell, two years; A. G. Farrar, three years, Secretary.

Two nuisances were reported to the board and were removed without much trouble. We have had seven cases of diphtheria with two deaths, and two cases of typhoid fever with one death. Every precaution has been taken with the cases of the contagious diseases; houses have been placarded, schools closed, and disinfection of clothing, bedding, etc., attended to.

#### ROBBINSON.

Members of the board: S. B. Hunt, Chairman; E. R. Waterman, Secretary; Stillman Gates.

We have had twelve cases of diphtheria with five deaths. As to the cause of diphtheria the physicians report "don't know." The disease has hung to that locality for years. We have been quite free from other diseases. Cases of the infectious diseases have been isolated, houses have been placarded and an outside messenger employed.

The cases of diphtheria occurring in October seemed to have originated from the use of bed clothing which had been used by cases in the spring, which were not reported to us. Disinfection of the clothing had not been carried out.

We need a better understanding of good health conditions of premises, and of living, and a closer compliance with the health laws and suggestions. The town is finely situated and only needs care.

#### ROCKLAND.

Members of the board: F. E. Hitchcock, M. D., one year, Secretary; C. E. Littlefield, Esq., two years; O. H. Tripp, C. E., three years, Chairman.

The city of Rockland has two water systems. The first is from Chickawaukie Pond, two and a half miles to the northwest. This

pond is elevated about eighty-six feet above the level of the city and has a storage reservoir about seventy feet above the city level. Our second supply comes from Oyster River Pond situated about seven miles in the same direction. This pond is about three hundred and thirty feet above the level of the city and the sea level. The company has a reservoir of great capacity situated on Juniper Hill at an elevation of about two hundred and fifty feet. The latter system is generally used by the citizens and by the city. This same company also supplies the towns of Thomaston and Camden and the village of Rockport.

The city has no systematic method of disposal of excreta. The garbage which is not fed to pigs on the premises is removed by hand-carts, etc., or by those keeping swine. This service is performed in a very objectionable manner and is a source of great annoyance to the board of health.

There is a sewerage system to a slight extent, perhaps one and a quarter miles. Considerable work has been done in that direction the past year. The people are awake to the need of proper sewerage. The high pressure of the water system makes sewerage a necessity and much more available than formerly.

About sixty nuisances have been abated by the board. Action in regard to nuisances and their abatement is in the hands of the secretary, no inspector being employed. In case of any difficulty the whole board act.

We have had four cases of diphtheria, ten of scarlet fever, and three of typhoid fever. The cases of scarlet fever in the outbreak in the latter part of the year were very mild and no deaths occurred. One death from typhoid fever.

The board has met with no material opposition. We have recommended an extension of the sewerage system and the introduction of a proper method of disposal of garbage, offal, etc. We have under consideration the trying of a garbage furnace constructed from a lime kiln, somewhat similar to that on Governor's Island, New York Harbor, as described on page 194 of the Second Annual Report of the State Board of Health.

#### ROME.

Members of the board: G. S. Tibbetts, one year, Chairman; E. T. Foster, two years; L. G. Martin, three years, Secretary.

We have had nine cases of typhoid fever, with two deaths. We personally visited three of the cases of typhoid fever, prohibited

the use of water from one well, and provided for the removal of all the infected excreta to a considerable distance from any water supply and buried. Persons not needed have been excluded from the patients and such other advice has been given as seemed needful.

#### ROXBURY.

Members of the board: O. J. Lovejoy, one year; W. H. Jenne, two years, Secretary and Health Officer; S. M. Locke, three years, Chairman.

No cases of the contagious diseases have appeared in the town.

#### RUMFORD.

Members of the board: Wm. H. Farman, one year, Chairman; F. A. Porter, two years; H. F. Abbott, M. D., three years, Secretary.

No report received.

#### SACO.

Members of the board: R. P. Tapley, one year; J. E. L. Kimball, M. D., two years; F. E. Maxcy, M. D., Secretary.

Quite a number of nuisances have been reported to the board and all have been removed with one exception.

We have had four cases of diphtheria and five of scarlet fever, with one death from each disease. Scarlet fever was introduced from Biddeford. Patients with infectious diseases are isolated; excreta, clothing and the house are thoroughly disinfected.

A section of the city which is traversed by the Woodbury brook is rendered unhealthy in the summer time by the exhalations from it.

#### SALEM.

Members of the board: Edgar Wills, one year; Rufus Graffam, two years, Chairman. S. F. Brackley, three years, Secretary.

No report received.

#### SANFORD.

Members of the board: A. B. Sanborn, one year; E. E. Hatch, two years; Geo. E. Allen, three years, Secretary; F. L. Durgin, M. D., Health Officer.

Seven nuisances were reported to the board and all were abated without trouble. We have had sixty-nine cases of diphtheria with

fourteen deaths, five of scarlet fever with one death, and eight cases of typhoid fever with one death. It is thought that the prevalence of diphtheria was due to impure drinking water in the school-house. Families in which there have been cases of the contagious diseases were isolated from the public and the patient isolated from the family as much as possible. At Springvale the school was closed until the disease abated.

#### SANGERVILLE.

Members of the board: A. T. Wade, one year, Chairman; O. B. Williams, two years; H. L. Leland, three years, Secretary; Austin Thomas, M. D., Health Officer.

We have had no cases of the infectious diseases, excepting measles during the fall and winter.

#### SCARBOROUGH.

Members of the board: W. F. Dresser, one year, Chairman; M. I. Milliken, two years; A. W. Larrabee, M. D., three years, Secretary.

We have had one case of diphtheria and two of typhoid fever. The sick with contagious diseases have been isolated, disinfectants used, and the dwellings cleansed after recovery. Two deaths occurred from drowning.

#### SEARSMONT.

Members of the board: P. S. Wing, one year, Chairman; J. E. Woodcock, two years; J. W. Farrar, three years, Secretary.

We have had no cases of the contagious diseases.

#### SEARSPORT.

Members of the board: W. O. Barney, one year, Chairman; W. B. Sawyer, two years; E. Hopkins, M. D., three years, Secretary.

The report states that fifteen cases of contagious diseases have occurred, but that there have been no deaths from them. The character of the diseases is not stated.

#### SEBAGO.

Members of the board: Wm. C. Poor, one year, Chairman; P. W. Sawyer, two years; P. P. Larrabee, three years, Secretary;

No report received.

## SEDGWICK.

Members of the board: M. L. Ellwell, Esq., one year, Secretary; J. W. Penney, two years; C. E. Wasgatt, M. D., three years Chairman.

The sanitary condition of the town is generally good. No cases of the contagious diseases occurred excepting one mild case of diphtheria.

## SHAPLEIGH.

Members of the board: Wm. P. Ferguson, one year; John Pugsley, two years; F. A. Bragdon, M. D., three years, Secretary and Health Officer.

Nine cases of typhoid fever have been reported to the board, though no deaths have occurred. Whooping cough and mumps have been prevalent. In connection with the cases of typhoid fever, as soon as they were reported we looked after the sanitary condition of the dwellings and saw that all precautions were taken.

In one family, six of the members had typhoid fever. The disease was brought home by one of them, a young man who had been at work in Massachusetts. He had there what the doctor called slow fever and was sick a week after his return home. In a short time four of the other members were taken sick. Another child of this family, two years old, was taken home by the wife of the doctor who attended the patient, and the doctor's wife and this child both took the disease in a few weeks. At North Shapleigh, a small village, the soil is very sandy, letting the surface water drain into the wells and causing considerable sickness.

## SHERMAN.

Members of the board: D. H. Owen, M. D., one year, Chairman; George W. Durgin, two years; Levi C. Caldwell, three years, Secretary.

Three mild cases of diphtheria have occurred.

Our board put up two notices in each school district, requiring the inhabitants to put their premises in good sanitary condition, which we think was quite generally observed. We have recommended to individuals changes in regard to some other method of keeping their premises cleansed, and our recommendations have generally been adopted.

## SHIRLEY.

Members of the board: A. T. Mitchell, one year, Chairman; Joseph L. Dennen, two years; Henry Blackstone, three years, Secretary.

There have been no cases of the infectious diseases.

## SIDNEY.

Members of the board: A. Sawtelle, one year; A. S. Morrison, two years, Chairman; A. E. Bessey, M. D., three years, Secretary.

We have had eight cases of typhoid fever with one death. One death occurred from drowning.

## SKOWHEGAN.

Members of the board: S. A. Patten, M. D., one year, Chairman; S. A. Bickford, two years; George Cushing, three years, Secretary.

We have some private aqueducts which furnish the very best of spring water, and a system of water works is now being put in to furnish a general supply of spring water. We are also putting in a system of sewerage. Eight nuisances have been reported to the board and of these five have been removed.

We have had six cases of diphtheria with two deaths, and two cases of scarlet fever and three of typhoid fever.

Measles has also prevailed. Patients with the infectious diseases have been isolated.

## SMITHFIELD.

Members of the board: Wm. J. Haynes, one year, Secretary; I. W. Varney, two years, Chairman; Charles M. Simmonds, three years.

Three nuisances have been reported to the board, and of these, two have been removed. We had five cases of typhoid fever, two of which terminated fatally.

I think that the first four cases of fever were caused by water pollution. The barnyard was near the well and on higher ground, and when, as the executive officer of the board, I was called to visit this family, there was found a pool of stagnant water in the corner of the yard, and I afterwards learned that the discharges of those who were taken sick first were thrown into the yard.

# SMYRNA.

Members of the board; D. D. Hemore, one year, Chairman; A. J. Berry, two years, Secretary; A. P. Daggett, three years.

We have had two cases of diphtheria and two of typhoid fever. In connection with cases of this kind, personal examinations have been made and such precautions taken as appeared necessary to prevent the spread of the disease. The two cases of diphtheria reported both occurred at one time and in a house and family where there had been a case of it several months previous.

Improved house drainage, better ventilation, and more care as to maintenance of proper outbuildings would, we think, be a benefit as a health measure.

# SOLON.

Members of the board: Stephen Merrill, one year; John Bean, two years, Chairman; S. F. Greene, M. D., three years, Secretary and Health Officer.

There have been no cases of the contagious diseases, excepting measles.

# SOMERVILLE.

Members of the board: Samuel C. Kennedy, one year; Morrill Glidden, two years, Secretary; A. L. Soule, three years, Chairman.

We have had one fatal case of typhoid fever, which seemed to have been caused by drinking water in the town of Washington.

# SOUTH BERWICK.

Members of the board: Edwin Jacques, one year; Jas. M. Bennett, two years, Secretary; Wm. A. Parsons, three years, Chairman.

No report received.

# SOUTHPORT.

Members of the board: Wm. Barah, one year; Sumner Orne, two years, Secretary; Wm. T. Maddocks, three years, Chairman.

Two deaths occurred from what is presumably typhoid fever, but the cases were not reported to our board.

# SOUTH THOMASTON.

Members of the board: F. Rice Rowell, Secretary; Wm. H. Luce, Chairman; Benj. D. Littlefield.



There has been an unusual number of cases of sore throat. The attending physician has been consulted in regard to precautionary measures and the circulars furnished by the State board have been distributed when cases of the contagious diseases have occurred.

#### SPRINGFIELD.

Members of the board: C. R. Brown, one year; E. C. Ryder, Esq., Chairman; P. H. Jones, M. D., three years, Secretary.

There have been eighteen cases of diphtheria, in one of which death occurred, and seven non-fatal cases of typhoid fever. Measles has also been prevalent.

#### ST. ALBANS.

Members of the board: N. H. Vining, one year; S. A. Maxim, two years, Chairman; C. A. Moulton, M. D., three years, Secretary.

Two cases of typhoid fever have occurred and there has been some prevalence of dysentery.

#### STARKS.

Members of the board: L. F. Butler, one year; J. F. Frederic, two years, Chairman; Thomas Buswell, three years, Secretary.

We have had two cases of typhoid fever, but they were not reported by the attending physician.

#### STETSON.

Members of the board: C. S. Emerson, M. D., one year, Secretary; H. S. Morton, two years; G. M. Bond, three years, Chairman.

We have had three nuisances, all of which have been removed. Three cases of typhoid fever occurred, but none were fatal. The village needs better drainage and the placing of the slaughter houses at its lower side instead of in the upper part.

#### STEUBEN.

Members of the board: Jas. C. Googins, Esq., one year, Secretary; Samuel Parritt, two years; G. W. Moore, three years, Chairman.

No report received.

ST. GEORGE.

Members of the board: H. H. Kalloch, one year; Whitney Long, Esq., two years, Chairman; Albert Woodside, M. D., three years, Secretary.

We have had two cases of scarlet fever; both recovered. One nuisance was reported to the board and removed.

STOCKTON.

Members of the board: J. F. Hichborn, one year; Chas. S. Rendell, two years, Chairman; A. S. Bird, M. D., three years, Secretary and Health Officer.

At the end of the year, on account of a change of residence of Dr. Bird, there was no executive officer and no further report was received.

STONEHAM.

Members of the board: Wm. L. Goodwin, one year, Secretary; N. H. Palmer, two years, Health Officer; Hilton McAllister three years, Chairman.

No report received.

STOW.

Members of the board: Benj. F. Guptill, one year; Isaac A. Walker, two years, Secretary; Chas K. Bickford, three years, Chairman.

No cases of the contagious diseases have occurred.

STRONG.

Members of the board: Hon. J. W. Porter, one year, Chairman; A. Hitchcock, M. D., two years, Secretary; G. Z. Higgins, M. D., three years.

As far as the board has been able to judge from observation the town is in an excellent sanitary condition. No cases of the contagious diseases have occurred. One nuisance only has been removed.

SULLIVAN.

Members of the board: E. F. Clapham, one year; F. W. Bridgham, M. D., two years, Secretary and Health Officer; Moses Hawkins, three years, Chairman.

We have had twenty-two cases of diphtheria with four deaths. Measles has also been prevalent. Our method of limiting the spread of diphtheria has been the placarding of infected houses, isolation of the patients and of the families, the disinfection of houses and clothing, and the avoidance of public gatherings.

#### SUMNER.

Members of the board: L. L. Gardiner, one year; Sharon Robinson, two years, Chairman; C. M. Bisbee, M. D., three years, Secretary.

Since the organization of the board the only case of a contagious disease which has been reported to the board was one case of typhoid fever. A year ago this winter there were eight or ten cases of diphtheria with three deaths. The infection was probably brought from Canton.

#### SURRY.

Members of the board: W. E. Emery, M. D., one year, Secretary; Jas. A. Milliken, two years; D. G. Means, Esq., three years, Chairman.

We had twelve cases of typhoid fever, one of which ended fatally. Eight of the cases of typhoid fever were in one family. They live in an old house in which the rooms are black with smoke, the plastering is falling off, and there are openings through the rotten floor into what used to be a cellar, but which is now a hole filled with all kinds of decomposing vegetable matter.

#### SWANVILLE.

Members of the board: C. M. Marden; H. E. Greeley; J. S. Cole, M. D.

No report received.

#### SWEDEN.

Members of the board: O. R. Maxwell, one year; Geo. Haskell, two years, Secretary; M. M. Hamlin, three years, Chairman.

Five cases of typhoid fever all occurred in one family. All recovered. There was nothing found in the sanitary conditions of the dwelling or the water supply to account for the fever.

Except looking into the condition of the fever premises and the school buildings nothing special has been done, only to learn our duty and be ready for work if it should be found expedient.

# TALMAGE.

Members of the board: F. R. Neal, one year, Secretary; George Williams, two years, Health Officer; Henry Dunsmoor, three years, Chairman.

We have had no cases of contagious diseases.

# TEMPLE.

Members of the board: Rev. O. Roys, one year, Secretary; L. N. F. Jenkins, two years; Silas Wilder, three years, Chairman.

A few minor nuisances have been removed by the board, but no cases of the contagious diseases have occurred.

# THOMASTON.

Members of the board: J. H. H. Hewett, one year, Chairman; H. C. Levensaler, M. D., two years, Secretary and Health Officer; John B. Walker, M. D., three years.

The water supply is furnished by the Rockland Water Company, and is taken from Oyster River pond, located eight miles distant in the town of Camden. The water is of excellent quality. We have no system of public sewerage, but the introduction of a water supply seems to make it more necessary than before. Quite a number of nuisances have been reported to the board, but invariably when the attention of the owners or occupants has been called to the complaints they have complied with our requirements.

Twenty-three cases of diphtheria have been reported to the board, and three of these ended fatally. There have also been two cases of typhoid fever with one death. The first case of diphtheria was apparently brought here from New York.

# THORNDIKE.

Members of the board: Alonzo H. Higgins, one year, Chairman; G. H. Rich, two years, Secretary; R. S. Ward, three years.

No cases of the infectious diseases have appeared in the town.

# TOPSFIELD.

Members of the board: E. Tupper, one year, Secretary; G. S. S. White, two years, Health Officer; Wm. H. Malkson, three years, Chairman.

No report received.

## TOPSHAM.

Members of the board: David Work, one year; E. M. Brown, two years; Secretary; I. S. Curtis, M. D., three years, Chairman.

We have had one case of diphtheria and one of scarlet fever, both of which recovered. Four notices of unhealthy places were reported and immediate attention was given to them to the satisfaction of the complainants.

## TREMONT.

Members of the board: Jas. T. Clark, one year, Chairman; Wm. A. Spear, M. D., two years, Secretary; John H. Gilly, three years.

There has been but one case of nuisance reported to our board and that was abated. There have been no cases of contagious diseases reported. But very little sickness has been present.

In conclusion, we wish thankfully to state that the past year has been the freest from sickness of all types known to our people for many years. Our secretary, being a physician of more than forty years' practice in this town, and visiting every part of it in his professional duties, has in such visits seen and corrected with the ready consent of our people, any unhealthy appearances without calling meetings of the board, thus obviating at once a source of expense to the town, and saving time in correcting an evil.

## TRENTON.

Members of the board: D. B. Alley, one year, Chairman; Wm. G. Bunker, two years; K. K. Thompson, Esq., three years, Secretary.

No cases of the contagious diseases have been present.

## TRESCOTT.

Members of the board: Stephen A. Wilcox, one year, Health Officer; Wm. H. Leighton, two years, Chairman; John Sanders, three years, Secretary.

There have been no cases of the contagious diseases.

## TROY.

Members of the board: Reuben Call, Chairman; M. T. Dodge, M. D., Secretary.

There have been no cases of the contagious diseases.

## TURNER.

Members of the board: J. H. Conant, one year; Maj. H. C. Haskell, two years, Chairman; S. D. Andrews, three years, Secretary.

When complaints of nuisances have been made to the secretary of the board a little friendly talk with the parties complained of resulted in a proper arrangement of things. We have attended to all such complaints and brought about a condition of things satisfactory to all parties. The inhabitants of Turner are an intelligent and cleanly people. We have not found it necessary, nor have we deemed it expedient, to be too oppressive in the discharge of our duties. We have had no cases of the contagious diseases, but when we do have we shall not hesitate to do what is necessary.

## UNION.

Members of the board: E. R. Daniels, Secretary; L. F. Bachelder, M. D., Chairman; Noah E. Shepard.

Since the appointment of the board the town has been unusually free from contagious diseases. We have had one case of typhoid fever in each of two different families, but none other of the specified diseases. One complaint was made of a nuisance and it was removed.

## UNITY.

Members of the board: John Perley, one year, Chairman; Benj. F. Kelly, two years; Jas. Craig, M. D., three years, Secretary.

No cases of the infectious diseases have occurred. Our school-houses are not in a good condition

## UPTON.

Members of the board: Chas. Chase, one year, Chairman; C. L. Abbott, two years, Secretary; Enoch Abbott, three years.

No contagious diseases have been present.

## VAN BUREN.

Members of the board: Michael Violette, one year; Solomon Madore, two years, Secretary; P. C. Keegan, Esq., three years, Chairman; Dr. Thos. H. Pelletier, Health Officer.

No report received.

## VANCEBORO'.

Members of the board: W. R. Finson, Chairman; C. A. Sterling, Secretary; Jas. C. Kirkpatrick; M. L. Young, M. D., Health Officer.

There have been five complaints of nuisances, and the conditions complained of were all removed. We have had one case of diphtheria which ended in recovery.

The work of the board has contributed much to the comfort of the community by removing nuisances of long standing, directing the disposal of excreta, cleansing of privies, disposal of garbage, and checking what, judging from past experience, would probably have been an epidemic of diphtheria, by prompt isolation and disinfection.

## VASSALBORO'.

Members of the board: G. L. Randall, one year, Chairman; M. K. Dwinel, M. D., two years; F. A. Libby, M. D., three years, Secretary.

There have been five nuisances reported during the year, all of which have been removed. We have had six cases of scarlet fever, one of which was fatal, and six cases of typhoid fever.

All the six cases of scarlet fever here reported occurred in one family. The mother also had typhoid fever. The land is low and boggy around the farm house. A good deal of care was used in confining the disease to this house. The most thorough disinfection was rigidly enforced, the child that died was buried at once, all clothing was destroyed or boiled and disinfected, the house fumigated, etc. The result is, we have had no other case in town.

Of the six cases of typhoid fever, two were brought into town from Massachusetts. Precautions were used in every case, and there was but one case in the family and no deaths.

## VEAZIE.

Members of the board: G. B. Marden, one year; Lewis H. Park, two years, Secretary; O. D. Winchester, three years, Chairman.

One fatal case of typhoid fever occurred. We spent one day in investigating the filthy places in town, and those found were cleaned up at our request. I do not know when we have had a year before with so little sickness.

## VERONA.

Members of the board: Joseph Allen, one year, Chairman; Peter Abbott, two years; A. H. Whitmore, three years, Secretary.

It has been an unusually healthy year in our town and there has not been a case of contagious disease. One nuisance was removed at the request of the board.

## VIENNA.

Members of the board: Horatio Porter, one year, Chairman; Laforest Dowst, two years; L. C. Davis, three years, Secretary.

One fatal case of typhoid fever occurred.

## VINALHAVEN.

Members of the board: O. P. Lyons, one year, E. H. Lyford, M. D., two years, Secretary; Wm. H. Littlefield, three years, Chairman.

Three or four nuisances have been reported and the orders and suggestions of the board regarding such cases have generally been cheerfully obeyed.

There were four cases of diphtheria in August, two of which proved fatal. These cases seemed to be of a croupous form, the throat and fauces remaining almost entirely clear. One case, reported in December, recovered. The dwellings and surroundings of these cases were in a very unhealthful condition.

## WAITE.

Members of the board: J. B. Phelps, one year; John Dudley, Esq., two years, Secretary; C. B. Tupper, three years, Chairman.

No cases of the infectious diseases have occurred. One nuisance was removed.

## WALDO.

Members of the board: John D. Webster, one year; A. J. Simmons, two years, Chairman; Geo. C. Harding, three years, Secretary.

We have had no cases of contagious diseases.

## WALDOBORO'.

Members of the board: Chas. E. Hovey, one year, Chairman; Everett Farrington, two years; F. M. Eveleth, M. D., three years, Secretary.



Two nuisances were reported to the board ; both were promptly removed without trouble, by the delinquent parties. There was one fatal case of diphtheria and five cases of typhoid fever, one of which ended fatally.

We have had but little to do during the year. In several instances we have been called upon to inspect localities, and the proprietors have cheerfully carried out our instructions in regard to putting them into proper condition. There seems to be a disposition manifest by every one to aid us in our work in every way possible.

#### WALES.

Members of the board : Benj. Hodsdon, one year ; Alden Moulton, two years, Secretary ; Jos. C. Bragg, three years, Chairman.

We have had four cases of scarlet fever. The cases were isolated.

#### WARREN.

Members of the board : Wm. Cutting, one year, Chairman ; Benj. B. Libby, two years ; J. M. Wakefield, M. D., three years, Secretary and Health Officer.

We have had one case of diphtheria ; eighteen, I think, of scarlet fever, and twelve of typhoid fever, with three deaths from the latter disease.

Two families have been nearly suffocated by coal gas as the result of carelessness.

#### WASHBURN.

Members of the board : O. H. Stoddard, Secretary ; F. H. Gardner, M. D., Chairman ; C. L. Stoddard.

Three verbal complaints of nuisances were received by the board and the nuisances were removed. The petition concerning the starch factory nuisance we have already advised you of. There have been one case of diphtheria which recovered and fifteen cases of typhoid fever, three of which ended fatally. As regards the cause of the cases of typhoid fever we cannot tell. At a meeting of physicians the lack of proper drainage was declared to be the cause in a great measure, but the drainage is the same as heretofore. It seems to us that the season has been a generally unhealthy one—extremely hot weather, and very little thunder and lightning.

In every instance where complaints have reached us, from whatever source, we have attended to them ; we have had dead animals

removed, and privies cleansed, we have supplied physicians with proper notices, and posted notices throughout the town giving name of secretary of local board and notifying all persons that reports of all cases of infectious diseases should be promptly rendered, and have otherwise endeavored to comply with the laws.

#### WASHINGTON.

Members of the board: H. B. Wright; T. S. Bowden, Secretary; L. A. Sukeforth, Chairman.

There have been three cases of scarlet fever and two of typhoid fever with no deaths. Two nuisances have been abated without trouble.

#### WATERBORO'.

Members of the board: A. C. Bradeen, one year, Chairman; F. J. Roberts, two years, Secretary; Luther E. Langley, three years. No report received.

#### WATERFORD.

Members of the board: M. Monroe, one year, Chairman; H. A. Lombard, M. D., two years; C. L. Wilson, M. D., three years, Secretary.

Two complaints of nuisances were made and the nuisances were abated without the interference of the board. There have been two cases of scarlet fever.

#### WATERVILLE.

Members of the board: S. S. Brown, one year, Chairman; J. H. Plaisted, two years; H. D. Bates, three years, Secretary; F. C. Thayer, M. D., Health Officer.

No report received.

#### WAYNE.

Members of the board: C. H. Barker, Jr., M. D., one year, Secretary; Willington Jennings, two years; J. S. Berry, three years, Chairman.

There has been one case of typhoid fever.

#### WEBSTER.

Members of the board: A. J. Larrabee, one year, Chairman; Jas. G. Jordan, two years, Secretary; T. C. Billings, three years.

Three nuisances have been reported to the board, all of which have been removed. We have had seven cases of scarlet fever with two deaths, and two cases of typhoid fever which recovered. As near as we could learn, the starting point of scarlet fever was in a family where they deal in rags.

We have had the principal drain in the village opened to carry off all stagnant water, and have caused several privies and sink-spouts to be renovated and cleansed. The houses and clothing of those sick with scarlet fever were thoroughly cleansed to the satisfaction of the physicians.

#### WELD.

Members of the board: L. L. Jones, one year; A. E. Houghton, two years, Chairman; C. E. Proctor, M. D., three years, Secretary.

Several cases of diphtheria and six or seven cases of diphtheritic croup have occurred.

#### WELLINGTON.

Members of the board: G. A. Herriman, one year; Wm. Lawrence, two years, Secretary; Reuben Whitehouse, three years, Chairman.

No contagious disease has been prevalent, except measles.

#### WELLS.

Members of the board: J. W. Gordon, M. D., one year; J. G. Hall, M. D., two years, Secretary; A. K. Tripp, three years, Chairman.

No report received.

#### WESLEY.

Members of the board: A. C. Hayward, one year; A. J. Coffron, two years, Chairman; H. F. Day, three years, Secretary.

We have had no cases of contagious diseases.

#### WESTBROOK.

Members of the board: H. K. Griggs, Secretary; A. H. Burroughs, M. D., Chairman; John Swan, M. D.

Our villages are supplied with Sebago Lake water by the Portland Water Company. A very few wells exist in the villages. We have had twenty-seven cases of typhoid fever with one death.

At Saccarappa a system of sewerage is begun and we have expended annually a liberal sum for five or six years, and intend to

continue to do so. This town for the last few years has grown at a rapid rate and many houses have been put up without proper cellars, sometimes with only a hole in the ground under the house, and this has often been the receptacle of the sink water. Heretofore the board of health has found difficulty in dealing with such cases, but under the new powers which were conferred in the act of 1887 proprietors have been required to remedy such nuisances. In one case we ordered the hole under a tenement house tapped and let out at least fifty hogsheads of putrid liquid and filth that had been accumulating for five or six years. Our privy arrangements are very faulty and the best recommendation which I can make for the improvement of the sanitary condition of the town would be the abolition of the present methods of constructing privies.

#### WEST GARDINER.

Members of the board: E. W. Alexander, one year, Secretary; S. M. Pinkham, two years; D. E. Merrill, three years, Chairman.

We have had two cases of diphtheria.

#### WESTON.

Members of the board: B. G. Marble, one year; Geo. W. Brannen, two years, Chairman; B. W. Brannen, three years, Secretary.

We had no cases of the contagious diseases.

#### WESTPORT.

Members of the board: W. M. Pierce, one year; Jas. Thomas, two years, Chairman; Jas. McCarty, three years, Secretary.

There have been no cases of the infectious diseases.

#### WHITEFIELD.

Members of the board: John S. Ryan, Secretary; Chas. F. Choate; W. Johnson, M. D., Health Officer.

Two cases of scarlet fever occurred.

The present health officer was appointed to fill a vacancy and on account of not having the records of his predecessor could make no further report.

#### WHITING.

Members of the board: Judson Hall, one year; A. M. Crane, two years, Chairman; W. I. Crane, three years, Secretary.

Since the organization of the board there have been no cases of the contagious diseases.

#### WHITNEYVILLE.

Members of the board: Sam'l Macdonald, one year; D. W. Rollins, Jr., two years, Secretary; Jas. Pope, three years, Chairman.

One case of typhoid fever in a mild form. We believe nothing could be done in this town to so much improve its sanitary condition at so slight an expense as a general adoption of the dry earth closet system.

#### WILLIAMSBURG.

Members of the board: M. W. Kennison, one year, Chairman; R. J. Williams, two years, Secretary; F. E. Dunning, three years. No report received.

#### WILLIMANTIC.

Members of the board: Frank Hart, one year, Secretary; John Davis, two years, Chairman; A. D. Wentworth, three years.

One death occurred by drowning on the C. P. R. R. The man was bathing and they put dynamite into the water above him to kill fish and he was drowned in consequence of the shock.

#### WILTON.

Members of the board: A. B. Adams, M. D., Secretary; J. T. Wilkins, Jr., Chairman; F. E. Atwood.

Three cases of diphtheria have been reported to the board and one case of typhoid fever. All the patients in both cases recovered.

#### WINDHAM.

Members of the board: C. M. Cobb, M. D., one year, Chairman; J. D. Harper, M. D., two years, Secretary; E. T. Smith, three years.

There have been three cases of typhoid fever.

#### WINDSOR.

Members of the board: Frank Colburn, one year; J. S. Gray, two years, Chairman; H. A. N. Dutton, three years, Secretary.

We have had no cases of the infectious diseases. Two cases of trichinosis occurred from eating raw pork. (The history of these two cases was given in the *Sanitary Inspector*, Vol. 1, p. 103. Sec.)

## WINN.

Members of the board: W. F. Lovejoy, Secretary; Jas. Rice, Chairman; A. L. Hall; F. N. Merrill, M. D., Health Officer.

No report received.

## WINSLOW.

Members of the board: Chas. B. Kidder, one year; W. S. B. Runnells, two years, Chairman; Geo. S. Paine, three years, Secretary.

A few cases of mild scarlet fever were reported.

## WINTERPORT.

Members of the board: Joshua Treat, one year, Chairman; Joseph W. Carleton, two years; C. F. Atwood, M. D., three years, Secretary.

The principal water supply of the village is from cisterns, and in the country from wells, in many of which the quality of the water is decidedly bad. Two nuisances were reported to the board. In one case the cellar was used for a privy.

The house was closed and remained so by order of the board until suitable out-buildings were provided.

We have had one case of fatal diphtheria, two cases of scarlet fever and three of typhoid fever. Measles has been prevalent.

The best method for improving our sanitary condition would be the sanitary education of old and young by means of teaching in the schools, by lectures, and by advice from physicians. The condition of many of our school-houses is abominable.

## WINTHROP.

Members of the board: Chas. H. Gale, one year; A. P. Snow, M. D., two years, Secretary; Col. C. A. Wing, three years, Chairman.

We have had one fatal case of typhoid fever. We have received three complaints of nuisances, all of which were promptly attended to by the owners upon official notice from the board. In some other cases we have given personal attention to accumulations of filth in the streets, or upon private premises, which have also been promptly removed upon notice to the parties concerned.

## WISCASSET.

Members of the board: Capt. Joseph Tucker, one year, Chairman; Capt. D. G. McRitche, two years; C. A. Peaslee, M. D., three years, Secretary and Health Officer.

Seven complaints of nuisances have been made to the board and all have been attended to.

We have had three cases of diphtheria and four of scarlet fever, but no deaths have resulted from these. When cases of the infectious diseases have occurred the infected houses have been placarded, patients have been isolated as well as possible, the appropriate circulars given to the family, and disinfection has been provided for.

## WOODLAND.

Members of the board: N. W. Stover, one year, Chairman; Andrew Johnson, two years; D. A. Snowman, three years, Secretary.

No cases of the infectious diseases have occurred.

## WOODSTOCK.

Members of the board: A. L. Rowe, Chairman; C. B. Rankin, M. D., Secretary; A. P. Bowker.

We have escaped all contagious diseases.

## WOOLWICH.

Members of the board: Howard Corliss, one year; Rev. H. O. Thayer, two years, Secretary; Sam'l P. Buck, M. D., three years, Chairman.

There have been two cases of typhoid fever, one of which was fatal. The first case was in a young woman who came home sick from the factory at Brunswick. This proved to be a mild attack of typhoid. During her convalescence her mother, a widow, took the disease, and, though the disease was mild, died from unfavorable complications. There were no other persons in the family.

## YARMOUTH.

Members of the board: R. Harding, Esq., one year, Chairman; W. W. Thomas, M. D., two years, Secretary; Chas. T. Grant, three years; Jas. M. Bates, M. D., Health Officer.

Yarmonth has been singularly free from all contagious or infectious diseases the past year. One, perhaps two, cases of typhoid fever contracted in other places and not reported to the local board by the attending physician, comprises the whole of this class of diseases that we have had, so that the labors of the local board of health have been comparatively light, being confined mostly to attending to complaints of nuisances.

#### YORK.

Members of the board: Frank H. Ellis, one year; G. W. S. Putman, two years, Chairman; W. L. Hawkes, M. D., three years, Secretary.

Six or seven slight nuisances have been reported to the board. These were all attended to. One case of diphtheria and three of typhoid fever have been reported to the board. None of these cases ended fatally. There has been less illness in the town than there has been for fifteen years before.



# Motives and Methods for Sewering Cities, Villages, Towns and Summer Resorts, and for Domestic Sanitary Improvements, House Plumbing, &c., &c.

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By E. C. JORDAN, C. E., Member of the Board.

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In presenting to the people of Maine the following paper upon sanitary matters, I have drawn here and there in illustrations and in text from various scientific writers, and if I fail to refer to my authorities specifically, it is because the material has largely lost its original form. As for instance, when a code of sanitary regulations has served its purpose in certain communities where it was first applied, and by use and re-use become a sort of common property.

Maine's protracted winter season with its extreme cold makes it difficult to adopt the methods that have proved efficacious in milder climates in providing a successful disposal of the liquid wastes in village towns (where there is no system of sewers), and in isolated dwellings, such as the summer cottages and farm houses of Maine. For about eight months out of the year the problem of a better method of the disposal of liquid waste is so easy of solution that to neglect it in the light of a knowledge of its necessity, may be called almost inhuman. At the rear of many houses in the country, and in villages oftener than elsewhere, in the angle or recess made by the junction of the L (in which is the kitchen) with the main body of the house (in which are the sleeping rooms) may be found one great destroyer of the human race: the Sink Spout! Close under the sleeping room windows and along the foundation walls of the house this enemy to health carefully cultivates and marshals his hosts of malaria. In the winter, such of these hosts as cannot escape into a warm cellar, seem dormant, but they are really accumulating strength, and at the return of warm weather they sog and burrow around the foundations and make forays to distant springs and wells borne on the rustling streams of their own sweat. All this goes on opposed only by the doctor's prescriptions or

the standard spring medicine that belongs to the locality, or the numerous but questionable allies, the cure-alls of proprietary medicine.

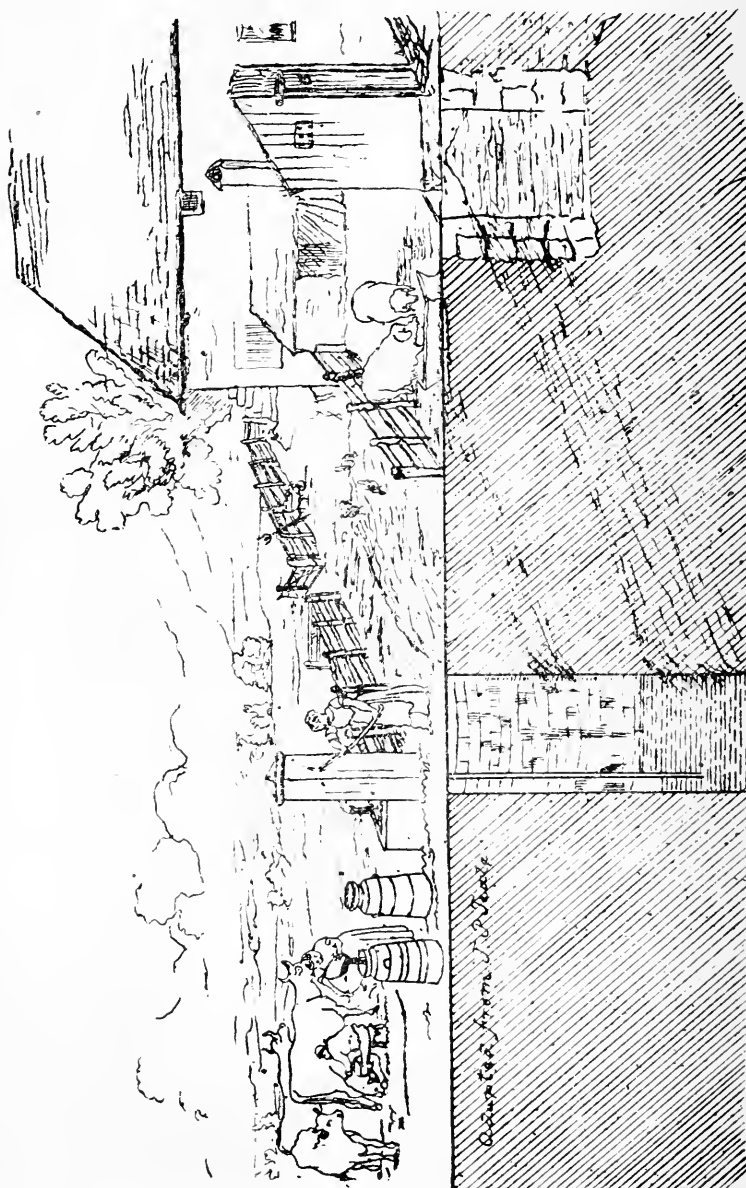


FIG. 1.

I have introduced the sink spout to you because it is not represented in figure No. 1, but it is there just the same, and is getting in its work just as effectively as the other things that are represented.

The picture is a familiar one, and is not exaggerated ; it represents conditions frequently met with, to wit a well in a farm yard, so placed that the general soakings from the manure, the privy and the sink spout, ooze through the soil into the well. The history of such a place is a history of sickness and death, of a scourge created or let

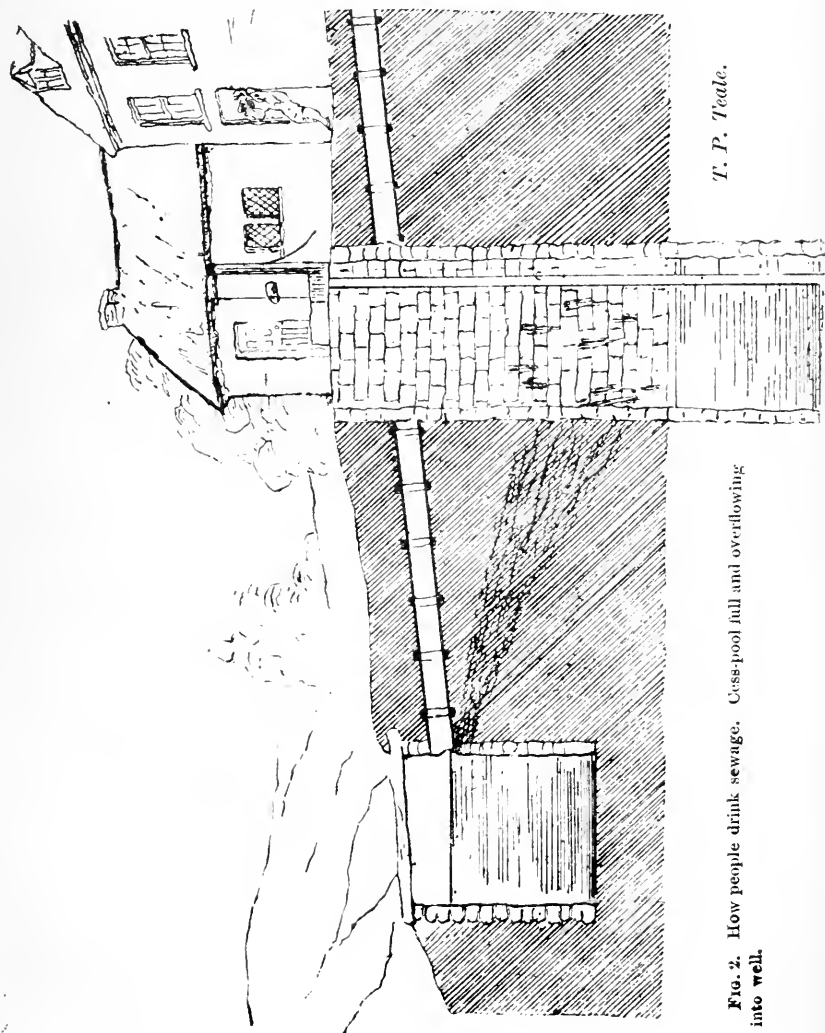


FIG. 2. How people drink sewage. Cess-pool full and overflowing into well.

loose, that has passed over our villages and selected for its victims the strongest and best, the very ones upon whom were resting the burdens of guarding the old and fostering the young. The germ of typhoid

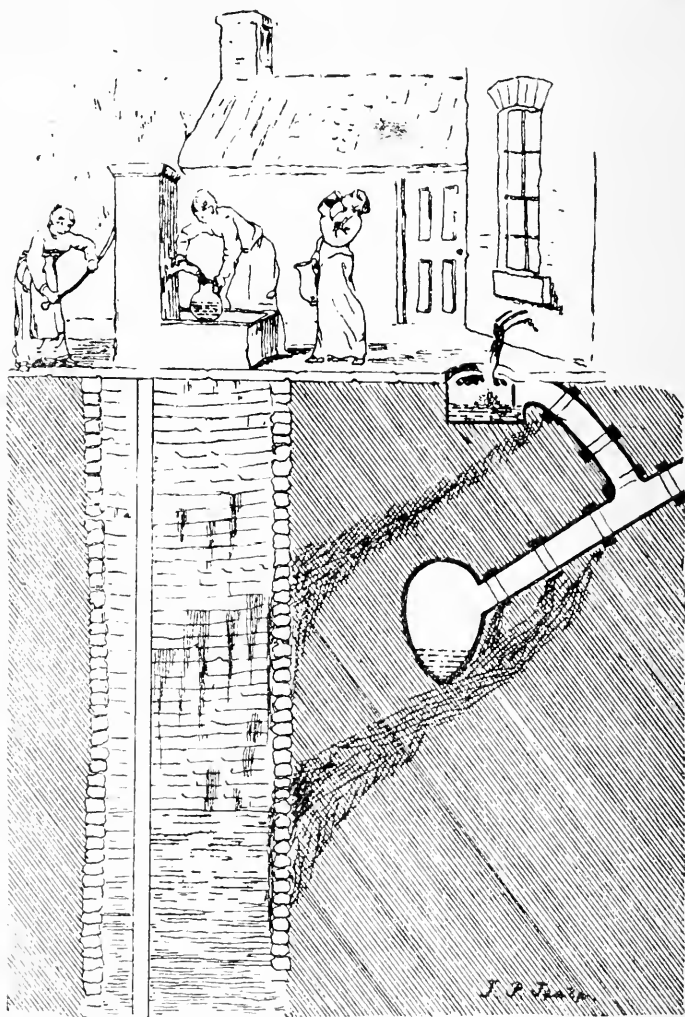


FIG. 3.

fever may have traveled on the soakage, from the privy to the well, from thence to be drunk in the water and redistributed. The milk may be made the vehicle for a general scourge by using such well water for dilution (?) or even for washing the cans, or it may come by

an indirect course, through the cows that drink such water. Fig. No. 2 shows pollution of well-water proceeding from an overflowing cess-pool. Fig. No. 3 shows pollution from a leaky village sewer laid under the supervision of a selectman, according to the rule and principle that "it is *tight* enough for practical purposes." The necessity of an independent water supply for such villages, I will speak of later on.

These figures that I have given are representations of how certain diseases are spread, from the fact now thoroughly ascertained, i. e., that the earth offers but little barrier, if any, to the passage through it of germs of disease. You may pour upon the ground water that is roily, i. e., loaded with impurities, particles of vegetable and organic matter, and stocked with germs, and catch it after it has filtered through hundreds, yes thousands of feet of earth, sand and gravel, and find it as bright and clear as crystal, yet a closer examination may show it to be just as full of germs, and just as potent a factor to create certain diseases as before starting on its filtering journey. I feel that the great work of sanitarians or boards of health is the promulgation of convincing testimony upon this and other kindred subjects. State boards, our own among them, are placing in the hands of their citizens, graphical illustrations of how typhoid and scarlet fever, diphtheria, small-pox and consumption, commit their ravages. The illustrations are no longer taken from distant countries, but from our own or our neighbors' back yards, right there or here in our midst, in our own villages and towns, to which family or commercial interests bind us, and we listen to, and concern ourselves about such accounts in a far different mood from that in which we read of the epidemics that go ramifying through foreign nations of people, spread from the polluted well-water, drank by the Pilgrims at Mecca. Histories of the outbreak of typhoid fever in certain large schools in England, or in the Queen's household, or to come nearer home, but still too far away, at Plymouth, Pennsylvania, do not have the effect upon us and do not start us examining our own surroundings with the same vim that comes to us when we are brought face to face with cause and effect right in our midst or in communities where our personal interests lie. And yet we ought to feel and perhaps do feel a home lesson in the Plymouth, Pa. epidemic, where 114 people died and 1153 were ill, and which was as disastrous in money measure as though a town hall costing \$711,104 had burned uninsured. Ignorance of the necessity of certain precautions and use of disinfectants costing

less than fifty cents for the first case, finally occasioned untold agony and grief and the loss of that large sum of money. The two volumes of our own State Board of Health are teeming with definite and convincing accounts which show where ignorance, for the most part, and in a few cases willful disregard of certain easily accomplished sanitary precautions, has resulted in hundreds of cases of sickness, death and future misery. It is almost needless repetition to speak of the many experiments that have been made to convince the unbeliever. Turn to the subject of typhoid fever, diphtheria and scarlet fever as indexed in this volume, and read the results from unsanitary surroundings. *Wells in the same general land slope and make up of soil are not safe against disease germs that may be planted in the ground on the higher slope, even if 1000 feet and farther away.* While the confirmation of this fact for short distances is quite common by direct experiment and is often shown in cases of illness in our own midst, yet the two cases cited by Dr. Vaughan of Michigan, will not be amiss as confirming the above assertion, and they are especially pertinent to the plea that I wish to urge in regard to towns and villages having a water supply independent of their own locality. Dr. Vaughan relates first that in a village in his own State the selectmen had chosen a certain site for a grave yard. The surface was covered with soil to a depth of about 18 inches, and below that there existed hard pan 2 or 3 feet thick and below that, gravel, while about 30 feet under the surface was an impervious bed of clay. Now 500 feet distant, and on a lower level than the grave yard, Dr. Patchen had a well, extending down to the same clay stratum, which he feared might become contaminated, if the grave yard were located as proposed. He verified his fears by spreading a salt of lithium upon the surface of the ground of the proposed grave yard and at a point 500 feet distant from his well. In 18 days lithium was found in the well. The other case that he cited is still more remarkable and alike conclusive, and the investigation was carried on by government officers, especially delegated to determine the cause of a sudden outbreak of typhoid fever in a village in Switzerland—one which had for many years been free from any such epidemic. It was the famous case, Dr. Vaughan remarked, so much referred to, that he felt ashamed to mention it, but did so because he thought its repetition might still do good; and so do I, and here it is.

Observation proved in village No. 1 that only those persons using water from a certain spring were sick. It was known that

typhoid fever had shortly before existed in village No. 2, located on the other side of a high ridge of land. The level or elevation of the valley in which was the second village, and its meadow and streams of water, into which the dejections of the typhoid patients had been thrown, was considerably higher than the spring which had spread the epidemic in village No. 1. The following experiments were tried to determine whether there was any possible connection. Several tons of salt, and several hundred weight of flour were thrown upon the meadow adjacent to village No. 2. The salt was found in the suspected spring but no trace of the constituents of the flour, which was held to prove conclusively that the mile of intervening earth had no large voids in it, but was fine, and a good barrier to the passage of particles of matter, but that in the percolation of water it was no barrier to the passage of the micro-organisms that started with the water.

The practical effect of the knowledge of the above facts upon a farmer, or any one about to build on one of the many acres of house sites he possesses, should be, to make him consider carefully just which of the sites offers the best sanitary advantage, namely: To locate his building so that the drainage is away from his well or spring supply; to carefully consider the slope of the ground with reference to the disposal of household wastes; to see that the foundation walls are not subject to saturation; in fact, to see that the drain from the cellar is at a depth not only sufficient to keep water below the surface of the cellar floor, but 2 feet or more below it. Such precautions having been taken, other sanitary details may be properly worked out as follows:

The Privy, instead of being located over a deep hole, to become a reservoir for a vile, seething mass soaking into the surrounding soil, a breeding place for pestilence, should have, as represented by Fig. 4, the bottom of the catch basin a little above the level of the surrounding ground.

During the period of drouth, or when the earth is dry, a large quantity of loam should be obtained, such loam as is commonly found just below the turf. This should be stored in a dry place, and a box kept filled from it in the privy. A scoop full holding a pint or more should be thrown down upon the excreta by every person using the privy. The catch basin should be small to insure its frequent removal. If such a rule is followed out it will never become offensive, and it would be as ordinary a duty of the farmer to drive his team to the

rear of the privy and load up the compost and spread it upon his fields, as any other duty in his farming life. For small summer cottages, where the feature of lawns and garden plats render a road to the privy objectionable, instead of a walled up catch basin, a tub

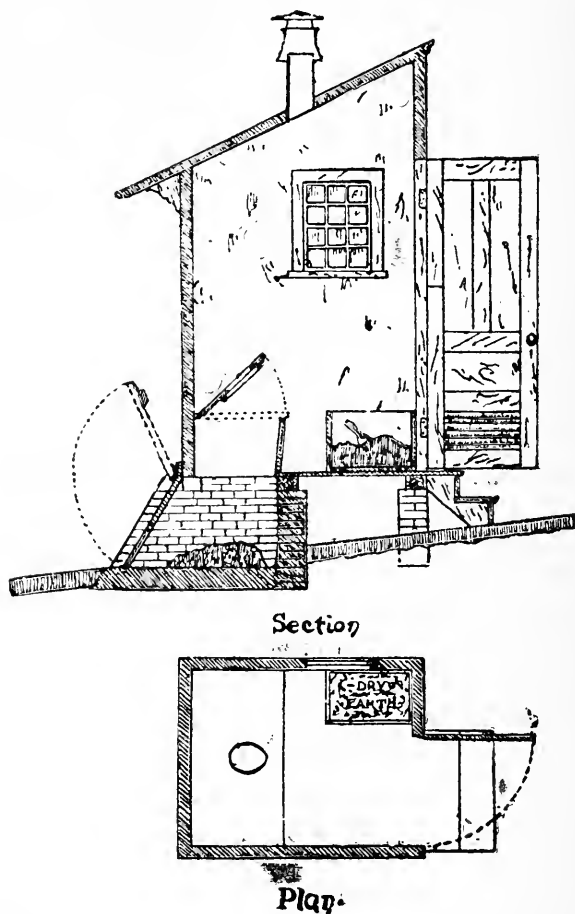


FIG. 4.

(Adapted from Gerhard's Drainage and Sewerage of Dwellings )

or strong box well coated with hot tar should be used. It should have handles upon it, and not be so large but that a man, or at least two men, could easily carry it when full, across the lawn to the roadway; a box 3 feet long, 2 feet wide and 15 inches deep is of good size. An extra box is desirable.



For the disposal of kitchen sink waste and general slop water, the diagrams that follow are adaptations from the methods first recommended in this country so far as my knowledge goes by that pioneer of many valuable sanitary appliances, Col. George E. Waring. It consists in introducing intermittently, the liquid wastes to a large area of soil immediately below the surface; that is, by occasional flushes of a considerable quantity, and then letting the water soak away gradually. The intermittent discharge allows the soil to dry out, and permits the air to penetrate into the earth and destroy the organic matter that has been flushed along with the waste water. "If the liquid is thrown on the top of the ground it produces a fuddled condition of the surface which prevents the free entrance of the air." The method in its simplest form is *especially* suited to the smaller summer cottages, getting to be so numerous along our coast. Figure 5 shows a box about a foot square sunk in the ground. In the top of it is set a wire pan strainer; tightly fitted into the bottom is an outlet pipe connecting with a drain made of 2 feet lengths of spigot and hub vitrified sewer pipe, 3 inches or 4" in diameter. The joints of this drain (it may be for only 6 or 8 feet) until it reaches the absorption tiles must be well filled and plastered with cement, care being taken to make tight joints, and to wipe out with a rag on a strong stick any cement projected into the inside of the pipe. The hub must be laid first, that is, on the highest ground. Ordinary agricultural tile 2 inch bore laid with joints  $\frac{1}{4}$  open commence at the end of the tight jointed pipe, and are laid in a trench only 10 inches deep, which may curve or slant across the lawn according as it is necessary to dig it to prevent it from running down hill faster than at the rate of about 4" in 100 feet. For a small family the length of the tile drain need not be more than 40 or 50 feet. A true, smooth grade is necessary, and is best accomplished by laying the tile upon a narrow board, and the best kind of tile is that made by C. W. Boynton, Woodbridge, N. J. A joint cap to keep the soil from tumbling in, comes with the tile. If our own domestic tiles are used, a small handful of shaving should be placed over the joint. This simplest of expedients for disposal of slops does not permit the pouring in of kitchen sink wastes, which must be arranged for as given in Figure 6, which shows a larger box divided in two parts, in the top of the smaller compartment of which is placed the wire pan described above. In front of the outlet from the smaller to the larger compartment is fitted a board about 1 inch away, and extending to within 3 inches of the bottom of the box, to prevent the floating particles of grease from getting into the side of



the box which is periodically discharged into the absorption tiles. The wire straining pan in both designs requires emptying from time to time into the ash barrel or some proper place, and the grease ought to be removed as often as it collects in any quantity. Figures 5 and 6 require the wastes to be *carried* from the house, a labor cheerfully assumed in many small cottages. A step towards greater convenience is shown in figure 7. For a summer resort it is a box of the same general design as in Figure 6, only it is connected by a pipe from the kitchen sink.

In a farm house, without a cellar under the kitchen sink, the pipe from the sink to the box would have to be thoroughly protected from the frost by some such way as boxing and filling in the air space with sawdust, that is, the pipe shown in Figure No. 7 by the dotted line, would have to be thoroughly covered in winter, but if there is a cellar under the kitchen, a five feet length of 3 inch cast iron pipe, and a piece 1 foot long with a 2 inch Y and a 3 inch brass screw plug in it, should be obtained, all put together at the nearest plumber's, and then arranged as shown by the full lines in Figure No. 7. The 3 inch screw plug, which can be removed, gives a chance to push out grease or remove such obstacles as might occur. I do not view the tank that is to be emptied so often as a cess pool, and after a study of the difficulties and expense to most of our farmers of arranging for a trap at the tank in addition to the one at the fixtures, I am prepared to recommend its absence in the more simple cases like the above.

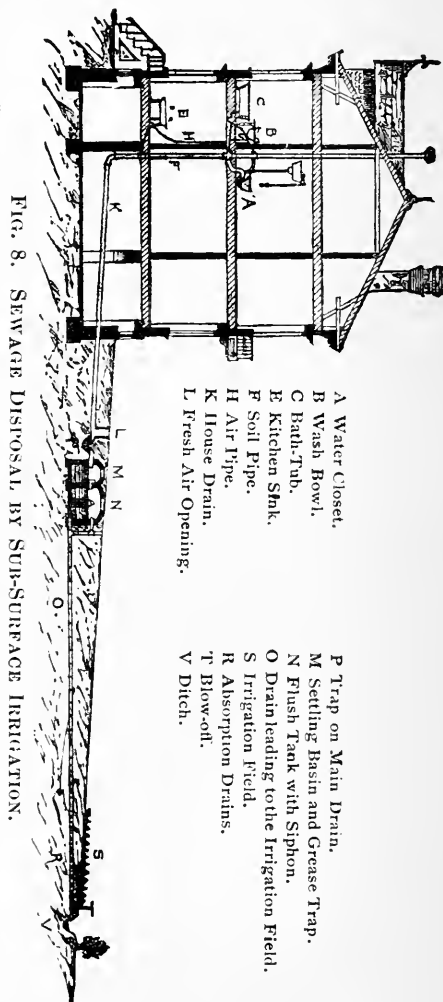
Another adaption to the conditions of the average country kitchen, where the thermometer drops time and time again below zero, is the trap in the sink and slop hopper arranged as follows: A ground brass plug and socket placed above the lead traps, which on cold nights can be emptied by removing the screw plug in its bottom. I have many times been told by a house holder "Oh, I can't put a trap on *that* sink, it would freeze every night. I try and keep a plate or something handy over the hole to keep the smell from coming out." The arrangement of the sink trap, as suggested in Figure 7, is immeasurably in advance of the above common practice, although idealists in sanitation might take exception to it because it requires the service of placing the plug. The woman, who by her own negligence, suffers from the trouble incidental to a frozen-up sink, (a dry sink they call it) soon takes the necessary precautions of emptying the trap and plugging up the sink hole, a duty to be performed as the laundry or kitchen fire subsides.

Letter A in Figure 7, represents a small round stick with a plug upon the lower end, which is pulled up and out, and so discharges the tank whenever the tell tale operated by a float at the bottom of the stick B, shows by its elevated position that the tank is full.

A low sharp pitched  $\wedge$  roof placed over the tank which has first been covered with planks and straw, will insure it against freezing in winter.

Undoubtedly it will occur to many that the absorption tiles laid so near to the surface, (10 inches) are liable to freeze in the winter season. Such has not been the fact in Massachusetts, where there are many such arrangements. The intermittent and rapid discharge, and the comparative warmth of the sewage, serves to keep it and the ground from freezing. I should suggest for our extreme northeru climate, that in the cases of limited application like the above, the line of absorption tile be protected by a thin layer of straw with a board on top.

In Figure 8\* we have a representation of the disposal of sewage planned more generously, i. e., to suit the conditions belonging to a large dwelling house or hotel, which has a much more abundant water supply than the occasional pail of water brought from the neighboring well or spring. Such a scheme requires careful plan-



ing and execution of work to serve well its purpose. There are

\*Loaned by W. T. Comstock, publisher of Gerhard's Drainage and Sewerage of Dwellings.

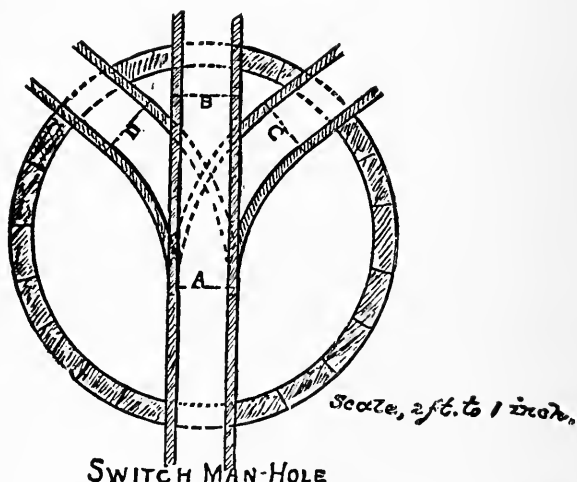
numerous cases of such an application in this country, and among those most notable that I have seen is its application to the inland Summer Hotels at Bryn Mawr near Philadelphia, and to the Sagamore Hotel on an island in Lake George.

In the latter place the sewage from the hotel accommodating three or four hundred guests is disposed of on a plat of ground about three acres in extent, and not more than 300 feet from the hotel. Even in the minor cases that I have given, it is necessary that the ground should be of a fairly absorbent nature, and sloped to drain well, or it must be made so by the methods absolutely necessary in the larger cases: that is, thoroughly surface sloped, and deeply sub-drained by agricultural tiles.

The last three cases are cited to show methods of disposal of sewage in considerable quantity where the opportunity and area of land is limited. For isolated summer resorts, where large and suitable areas can be commanded, which are at a distance of 1500 or 2000 feet from the house or hotel, the expense of arranging the tiles for sub-surface disposal can be avoided by arranging for disposal of the sewage upon the top of the ground as follows:

Lay a tight pipe sewer from the house to the immediate vicinity of land selected. At the highest point on the land construct a tank, which shall have two compartments, one somewhat smaller than the other, and whose size shall be sufficient to hold the sewage accumulated over a period of 24 hours, or at least 12 hours. The sewer should be arranged to deliver into either compartment, although except when cleaning out solids, it should be connected with the smaller. At the overflow point from the smaller to the larger it is easy to arrange the arrest of the solids of the sewage, that is, the paper and undissolved parts by means of a hanging screen. In addition to a discharging outlet at the bottom of the tank, it should have an automatic discharge, which is best arranged for by Field's Annular Siphon, which is a patented appliance controlled by the Drainage Construction Company of Newport. There are certain other arrangements of siphons that are not patented, and that are nearly as effective. The sewage as it runs from the tank, may be handled in the various ways of irrigating that are best for any special crop, but among the methods most common, where comparatively large quantities are to be disposed of, is to dig shallow ditches from the tank across the land below it, either on straight or curving lines, according as it is necessary to keep the grade of the ditch from falling more than a few inches—say 3 in

100 feet.—A temporary dam (made of sods or a wide board) is placed on the ditch, which, when the tank of sewage is discharging, causes the ditch to overflow on the land in that vicinity. From day to day the dam is moved a little further on, and the surface flooding repeated; meanwhile the first sections are drying out, and are soon ready for another dose. The services of one man less than two hours a day, is all that is needed in taking care of the quantity furnished by a hotel accommodating four or five hundred guests, where the wish is only to dispose of the sewage, and avoid a nuisance; but under the conditions of an available market, a decided profit has been obtained by specially arranging plats of land, and establishing a systematic irrigation of certain crops.



**SWITCH MAN-HOLE**  
*AB, AC, & AD represent pieces of vitrified sewer pipe*  
*Piece AB is removable*

*The same curved piece can be used in positions AC & AD*

It often occurs that the shape of available areas demands the location of sewage tanks in several places, and I have found the following inexpensive switch man-hole to answer very effectively its purpose of directing the sewage from the main line to whichever tank desired.

An explanation of the switch man-hole, of which the above is the ground plan, is as follows: On the straight line through the man-hole is a piece of sewer pipe that can be lifted out of its bed, which is formed in the cement at the two ends only. In the man-hole is stored a curved piece of the same size, the bed for which, outside of the

limits of the straight piece, is also formed in the cement. Upon removing the straight piece the curve piece can be used to direct the sewage to the right or left by turning it end for end to fit the desired direction. This man-hole, which cost only \$15 dollars replaced one costing \$100 dollars made of water gates, whose projecting edges and division walls collected rags and paper, and occasioned repeated stoppages.

The above general system, which I have briefly sketched in its limited application, is capable of great expansion, varying only in its details to suit enlarged conditions. A stringent law exists in England against pollution of brooks and rivers, and the result is that numerous small inland cities establish sewage farms as a method of disposal. The subject is growing with the growth of our own country, and already at Pullman, a few miles out of Chicago, may be found a most successful illustration.

Among those that I have seen that paralleled Pullman, is a city of about the same size, (8000 inhabitants) six miles out of Liverpool, and the only variation upon the method that I have described above, is that the whole farm of 100 acres is laid out in five-acre beds with ditches along the higher edges. From the large tank reservoir holding twenty-four hours' supply, tight pipes extend to the various sections of the farm; upon these pipes there are placed numerous hydrants, which are opened to flood the ditches, which in turn overflow upon the land. A man goes along with a board fitted to the section of the ditch, and dams it where it is needed to accomplish uniform flooding. The sections flooded this season are devoted to the growth of grass in the next, and this grass I found, to my surprise, is cut and disposed of in its green state to the dairymen, near Liverpool.

Maine with its hundreds of miles of picturesque rock bound coast, its safe surf beaches for bathing, its inland hills, brooks, rivers and lakes, is fast becoming the great summer resort of the United States. Lessons in sanitation are taught and are thoroughly learned in our centers of population, and our farmers and the hotel proprietors are often surprised by the class of inquiries and style of inspection made by their proposed summer boarders. Often have wearied city residents sought recuperation in the country air, and found it not, because of the local poisoning by the pestilential privy vault, the malarial air arising from the ground under the sink spout, the polluted well water, and in fact because of a class of unsanitary surroundings to which by reason of their debilitated tone they are extremely sensitive.

If landlords are not urged to take the precautions above indicated as necessary by reasons of humanity, selfish interest will soon dictate it as a matter of policy, because of the discrimination now occurring incident to the wide promulgation of sanitary knowledge.

Thus far I have written with the view of meeting the conditions as presented in sparsely settled communities. In village towns and cities the problem is more complex, and the duties incident to it are more exacting.

#### WATER SUPPLY.

I propose to go over in a general manner, what these duties are with reference to water supply, sewerage and plumbing.

It is oftener the case that selfish motives are the ones that first actuate the town to a move that becomes incidentally a step in sanitation. A conflagration occurs that sweeps away some of the material wealth of a town. A protection against fire is then demanded, i. e., an extensive water supply. Business men are driven to favor the scheme, because an insurance agent says, "it will cost you to insure your building \$50 per year with, and \$100 without a water supply. In the contest that usually takes place, the voice of the resident physician is heard calling attention to the demon of the polluted spring or well (Typhoid Fever) a demon who often robs a household of its bread winner, since its victims are more commonly found among the strong. They claim, and are able to prove conclusively, that a pure water supply is the force that can not only stamp down that demon, but can make a decided betterment in the general health of the community. Yet I am sorry to say that the humanitarian motives avail but little, except so far as the votes from the stricken households may carry down the balance when merged with the greater weight of selfish interest that seeks protection to purely material things. Within the last five years it has been less and less difficult to get large villages or cities to adopt a water supply. The use of large quantities of water is a *luxury* that many people will aim to afford, and based on that fact and the decreased cost of constructing water works, there are companies that stand ready to build works on very favorable terms. It has not been at all unusual for cities of fair size to sell for quite a sum the right to build water works, and stipulate that the charge to each family shall not exceed a certain sum. The above reason makes it less necessary for me to take up space in arguing for a water supply and I will turn my attention to the subject of drainage and sewerage.



To many minds the two latter terms are synonymous but my meaning will be plain from what follows in calling attention to the marked benefits that accrue to warrant the construction of a *drainage* system alone.

The matter of drainage of the soil under and about our houses was pointed out by Dr. Bowditch of Mass., the eminent specialist in lung troubles, as of paramount importance. When in his practice he found a family who called for his services with unusual frequency, or noticed a continued low nervous tone existing in their midst, he more often than not, found damp cellars and foundations a condition thereto. Take such conditions and aggravate them by having a copious supply of water polluted by the general waste of a household, and let this saturate the soils about the house, and what may you not anticipate? It would make a veritable hot-bed for the growth of disease—an abiding place for those germs that may not have their causation there, but which seek such an atmosphere for their development and growth. Such sanitary conditions extend an invitation to sickness, debility and death, not often refused by those busy visitants. To illustrate still further; there are towns built upon low flat stretches of land lying along rivers which are the sources of water supply, to which a system of drainage alone, done with agricultural tile, is valuable and profitable; from the fact that the cellars and foundations of the houses are drained, the soil rendered dry, malaria prevented, land made available that was otherwise condemned as unfit for any use, and the general health of the community vastly improved by such means. But in addition, that town must take upon itself the burden of another system for the disposal of excreta and liquid refuse. It is not permitted to leech down through leaky cess-pools to pollute the water supply. No! they must incur the expense of its collection in tight boxes and thoroughly cemented brick vaults, which shall be absolutely tight, a condition difficult to maintain in this cold climate: it must be deodorized by dry earth and the whole removed frequently, almost daily, by apparatus employed for the purpose. Sanitary science obliges us to treat certain matters with a prominence needed to a full understanding of their importance to health, and the odorless excavator ought to be able to perambulate our streets as frequently and constantly as needed without comment or surprise on our part. Theoretically, good sanitary results can be achieved in this way, and in some few cases have been, but practically it does not succeed except in its application to thinly settled communities, i. e., isolated houses as I have described in the first

part of this article. If in a city or village of any considerable size all liquid waste had to be removed by carts employed for the purpose the operation of that machinery would more often than not prove a troublesome matter and one liable to grave sanitary complications incidental to hitches and delays. Moreover the expense is much greater than where there is a fair chance of disposal of the sewage by what we call "water carriage," which should be planned for as soon as a proper outfall can be obtained.

The growth of villages and cities in Maine has a sort of crystalized conservatism and a system of sewerage under such conditions should mean the accomplishment of two things: 1st, the removal of excreta and the general liquid wastes of a household—all of which is grouped under the general head of *sewage*; 2nd, the drainage of the subsoil. I have not included the drainage of the surface in a sewerage scheme as is the case in Portland and some of the larger cities, and my reasons I will give a little further on, when I speak more in detail of the methods that seem to me advisable.

I would like in the first place to analyze still further the motives that should control the citizens of a village or city that have become aware of the desirability of making a move in sanitation. If I can show them that there is money in it individually and collectively, that there is in it town prosperity; in other words that it is a good investment for each and every one of them to make the loan that is necessary to start and construct by degrees a carefully matured scheme of sewerage, it will be done. The difficulty of the task arises from the fact that our education has been such that we have never put a money value upon that which is priceless to us—our lives; we feel that our right to live is not a matter of argument or calculation, but we are slowly realizing that any abridgment of our action and our well-being calls for some equivalent in money, if it has been caused by something or somebody independent of neglect on our own part. If this Maine Central Railroad that passes through our State, neglects to equip itself with any of the modern improvements, air brakes for example, which are known to make life more secure, and by such neglect occasions to one of us the loss of a leg, an arm, or our life, we do not need to be taught that we can collect from that corporation some measure of money for every minute of agony we endure, every day that we are bedridden, and that if permanently crippled we can very likely obtain an amount in proportion to the value that the community placed upon our service, as a farm laborer, as a skilled mechanic or as a legislator.

a value all the way from a \$1000 to \$100,000. If we are killed outright the law says in this State, not less than \$500 nor more than \$5000 *shall be paid* our heirs.

Towns on more than one occasion have learned what value is set upon injuries received by reason of defective highways. Our co-operative societies, the Masons, Odd Fellows, Knights of Pythias and the Travelers' Insurance Company for instance, can tell us what it costs to be ill, and what the money value of labor lost is. Can we not readily see and admit that there is a *force* in every human being that may be measured and valued?

Before our Civil war the money value placed upon the working force in a slave, a young negro field hand, was \$1000 and upwards, and upon a skilled mechanic over \$3000. Dr. Farr and Edwin Chadwick both eminent sanitarians practically confirm these estimates. Dr. Farr says that in England an agricultural laborer, at the age of twenty-five years, is worth, over and above what it costs to maintain him, \$1191, and that the average value of every man, woman and child is \$771. Edwin Chadwick says, that each individual of the English working classes, (mere children work there we must remember) is worth \$890, and at forty years of age \$1780. Our values in this country are much greater. Take the probabilities of our length of life from the insurance tables, and put our labor on the market for that term of years, and you will find what we are worth to the community.

The town realizes at once its loss when uninsured property has been destroyed by fire, and insurance is only the distribution of a burden too great for individuals or small companies to bear, but when a man in the productive period of his life is poisoned to death by polluted water or air, the citizens who gather at his funeral speak of the loss of a good husband, brother or neighbor, never realizing that which would have moved some of them much more, viz, that the town had lost something that had its measure in dollars—and thousands of them. If the citizens of a town realized that there was an incendiary applying a torch to many of its best buildings, think you they would not offer large rewards for his capture? Would they hesitate to tax themselves to maintain a protection guard, until the fire bug was caught?

I believe a town is just as responsible for the loss incident to sickness or death arising from a *preventable disease* where no negligence on the part of the victim has occurred, as she is for an accident upon a defective spot in her highways. The same is true of the Maine Central Railroad if she neglects to equip herself with the various appliances known to contribute to the safety of the public. This liability for sanitary defects is being driven home by repeated decisions of the courts in England. Only last year a man collected \$11,140 as a measure of loss for one death and additional sickness occasioned by sanitary defect in his house.

During this last month of February 1888 a jury in Washington, D. C., gave damages to the amount of \$15,000 in a case where a child had died of diphtheria, on account, as alleged, of defective sewerage. These cases are but the beginning of a public realization that certain diseases are caused or rendered fatal by reason of the absence of proper drainage or sewerage facilities, and that loss occasioned by such defects must be made good by the town or individual guilty of negligence.

What will a proper system of sewerage do for city or village town?

I will not discuss the increased valuation that would result from the new citizens that it would attract within its borders, but simply place before you the results that can be assuredly anticipated among present inhabitants, that is, the decrease in the number of deaths each year, and the decrease of sickness and thereby the necessary increase of prosperity. The maxim of Sir James Paget in his address before the International Health Exhibition, London, cannot fail to be accepted by thinking people. "The greater part of the national wealth is the *income* from the work which is the *outcome* of the national health." The table of statistics which follows represents the advance sanitary science has made towards the prevention of death and disease. The popular use of this table as an argument in favor of a sewerage system for a town, is quite extended among sanitarians and some are constrained to apologize for the want of novelty in their arguments, but until the collection of vital statistics in this State or in this country can enable us to compile one, from the results around us, it is too valuable for us to neglect its use for any such reason, and I recommend that it be studied carefully.

Name of Place.	Population in 1881.	Av. mortality per 1000 before construction of Works.	Av. mortality per 1000 since completion of Works.	Saving of life per cent.	Reduction of Typhoid Fever, rate per cent.	Reduction in rate of Phthisis per cent.
Banbury,	10,238	23.4	20.5	12½	48	41
Cardiff,	32,954	33.2	22.6	32	40	17
Croyden,	30,229	23.7	18.6	22	63	17
Dover,	23,108	22.6	20.9	7	36	20
Ely,	7,847	23.9	20.5	14	56	47
Leicester,	68,056	26.4	25.2	4½	48	32
Macclesfield,	27,475	29.8	23.7	20	48	31
Merthyr,	52,778	33.2	26.2	18	60	11
Newport,	24,756	31.8	21.6	32	36	32
Rugby,	7,818	19.1	18.6	2½	10	43
Salisbury,	9,030	27.5	21.9	20	75	49
Warwick,	10,570	22.7	21.0	7½	52	19

You will perceive from the inspection of this table that the population of the towns varies from 8 to 68 thousand, and that the sewerage system prevented the death of nearly five persons per year in every thousand. In addition to the effect that a system of sewerage has upon the general health or death rate, you will notice how striking its effect is upon the typhoid fever rate, and typhoid fever is but a type of several other filth fevers. In several cities you may notice the sewerage system has abated from two-thirds to three quarters of the cases, and supplementary to these I find that the recent records of Berlin and Munich show an abatement of four-fifths of the cases. You will notice also the effect upon that dread New England disease, consumption, of which, no doubt, with the modern methods of sub-soil drainage, fully one-half the cases can be abated. Of kindred significance would be its effect upon pneumonia which has been so prevalent during the past year. I want to place before you a suggestion of the amount that a small town could afford to expend, if she were enabled by a sewerage system to save *only* two lives every year for each thousand of her inhabitants on the basis of 5000 inhabitants. This amount is entitled to include all the attending circumstances of death and sickness. As a matter of statistics 25 people are sick on an average 9 days for every person that dies.

The problem is as follows :

Funeral expenses of 10 deaths saved, at \$50,	\$500
250 cases of sickness saved, including medical and other attendance and value of loss of time, at \$10 each,	2,500
Of the 10 saved 5 would be in the full vigor of life with average of 30 years labor to sell, value each \$3,000 ;	
hence value of labor saved. $\$3,000 \times 5$ .	15,000
	<hr/>
Total,	\$18,000

This amount represents the annual increase in wealth that such a community can anticipate from a sewerage system, or in other words, it is what it costs for each and every year that such a work is neglected. Such anticipated results can not be lightly put aside as "theory," A *practical working out* of the principles of sanitary science as at present known are represented by the preceding table of vital statistics. The gradual development is shown by what it has done for the great city of London in lowering its death rate from 42 in 1681, to 21 in 1884, and its modern advance by the abrupt lowering of the death rate on the *heels of completed* works, four or five in a thousand.

We are far from being without vital statistics in this country from which similar conclusions can be drawn. The death rate for a thousand inhabitants (without much other classification) in quite a number of our older cities, is a matter of record and testifies as follows: Boston's death rate, since about 1846, has decreased nine in a thousand. New York for the same period, nine and Brooklyn four.

Baltimore and Cincinnati, practically without sewers, have increased their death rate two and three per thousand. Chicago has decreased her death rate 16, and Memphis 22.5 per cent. Of course I do not want to be understood as asserting all this as the direct outcome of a sewerage system.

Sanitary science covers a broad field, and great advances have been made on various lines of action. Just what proportion of these advances may be fairly attributed to sewerage systems it is difficult to say, because in most cases the system grows with the city ; but Chicago and Memphis like the English cities cited, introduced and completed their systems *rapidly*, and the beneficial results that followed are held to have attached themselves to that fact alone. Many of our cities are reversing the old rule of being less healthy than the country places about them, more particularly the villages. It is undoubtedly owing to the fact that the value of sanitary ordinances and

their enforcement is more generally known in cities, while their neglect in villages has often precipitated a scourge, whose effects have been felt for many years.

#### CLASS OF SEWERAGE SYSTEM.

I have stated that for the slow growing cities and villages of Maine the object of sewerage should be the removal of certain wastes, and the drainage of the subsoil, and not necessarily the disposal of storm waters in the sewers; and now I am prepared to tell why.

In Portland, Boston, New York and in most cities throughout the world, cities whose systems were inaugurated twenty or more years ago, you will find that the size of the sewers are sufficient to carry off the larger part of the storm water. In a densely built city where streets and yards are paved, nearly all the storm water finds its way to the sewer in a short time, and to take care of it requires sewers of great capacity. When the storm ceases, you will find in the same sewer, a little sluggish thread of a stream bordered with filth, from which noxious gases rise, and all the conditions are made favorable for the propagation of deadly organisms.

This difference in size of sewer needed to carry sewage only, may be realized by the fact that the sewage contributed per acre in a city of ordinary density in population rarely exceeds 2500 gallons in 24 hours, whereas it is not very unusual to have a shower in which 50,000 gallons are poured down upon each of many adjacent acres, and that in a very few hours.

A practical illustration exists in the built up suburb of a certain city in which a six inch sewer pipe is satisfactorily taking care of all the sewage from a territory where formerly a 30" brick sewer had been considered as necessary to carry off the storm water and sewage combined.

It is the enormous cost of sewerage systems in cities that has made village towns suppose that sanitary relief for them meant bankruptcy. But the great element of that cost is the size of the sewer necessary, as I have shown, to take care of the storm water, which feature can in most cases be eliminated from the problem. It can most always be taken care of in the gutters with occasional shallow sub conduits at business centers. It is evident that better sanitary results are to be obtained by a system of comparatively small smooth pipe sewers, whose sizes are regulated to the duty that they are to perform *constantly*, and which has not the wide filthy surface that always exists

between the high and low water mark of the occasional storm, in the sewers of the combined system.

I have been frequently asked by selectmen or committees to meet them on a certain day, and tell them just what they ought to do in regard to sewers in their town, or I have been asked if this or that plan would not be the best. I am usually obliged to answer that the data is not at hand to guide a proper conclusion. I further explain that just how much land has slope that would collect and send its sewage through a certain street, and just what the size of that sewer should be, cannot be determined until a plan of the streets and their levels is obtained. If extravagance is to be avoided you must consider the whole subject, so that whatever is done in any one year, shall be part and parcel of a scheme in harmony with what you will want to accomplish in subsequent years. It is not possible for any engineer to advise intelligently without what is called a contour plan of the locality. It is from that that the drainage arrears are determined; the size of sewers, the collecting sewers, and the best outfalls, and the most economical solution of the whole problem.

The making of such a plan should proceed under the advice of the engineer consulted in the sewerage matter, and if the town has not a set of valuation plans, always of the greatest profit in levying taxes, the same survey can be made more economically than at any other time, to include the data necessary for them. By such action the town will not be left empty handed during the period of controversy that usually ensues between the proposed and the finally accepted scheme of sewerage, and the data will always be at hand when further advice is wanted.

Model plans of this character may be seen in the city of Portland, Maine.

#### HOUSE DRAINAGE & PLUMBING FIXTURES

With the advent of a water supply to a village or city, the tinkers or "tin-knockers" become plumbers. The man who can join lead pipe together is in demand. Tin and galvanized iron pipe is made to do duty as conduits for sewage above ground and a wood or stone box drains, or several lengths, *if they are particular* (?) of unjointed 12" sewer pipe are laid through the cellar and out into the street. For fixtures in such places you will find pan closets and spiral washing hoppers, and such other abandoned affairs as the irresponsible dealers in plumbing supplies of older cities have been able to work off. The intelligent plumber, if one was there, claims, when bitter experience incident to such work educates the public how they have been outraged



by him, that competition and the public ignorance of what was proper, obliged him to lower the standard of his work and methods, if he cared for patronage. A safe enjoyment of the benefits and conveniences of a plumbed house can only be had by following certain simple fundamental rules, which may be briefly stated as follows. [See figure 10]:

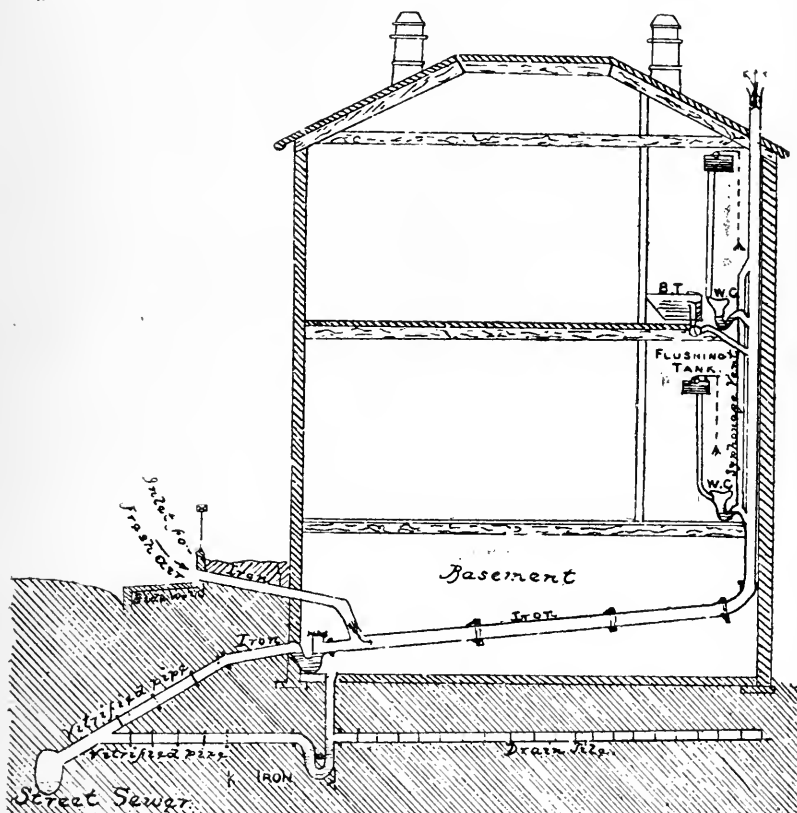


FIG. 10.

Extra heavy iron soil pipe (4" in diameter being sufficient for a fairly large house) should start from a point five or six feet outside the house, and extend full size through and out of the top of the house. Place no patent cowl on the top—they get clogged with ice and snow and defeat the end desired. There should be a trap on the soil pipe against the street sewer gas, and there should be a fresh air inlet on the house side of this trap, care being taken in its location as against the

occasional downward draft and against its liability to freeze the adjacent traps if the connection is too direct. Fixtures, as they are connected with the soil pipe, should be separately and independently trapped, and the system of piping should not be concealed behind a covering that is even easily removed, or in niches, but be open to view at all times and in all the details possible. By such an arrangement the growth of any imperfection is detected and checked, while on the contrary if the plumbing is covered in, the discovery of defects are rarely made until sickness suggests the hunt.

Figure 10 represents, in a measure, the application of the rule, and as this article is intended more especially for the inhabitants of the cities newly enjoying the opportunities of water supply and sewerage, I wish to impress the fact that the standard herein set cannot be lowered. Do not for a moment suppose that proper economy can be practiced by ending the soil pipe at the water closet.

Its extension through the roof and its open end are the conditions under which water in the traps to our various fixtures can be maintained as a barrier against the entrance of sewer gas, which, when expanding or acting under pressure, caused in the ordinary use of water-closets and in many other ways, forces itself through the water seals of adjacent traps unless it has a free outlet at the top of the house. By means of the fresh air inlet a current of fresh air is kept passing in at the foot and out of the top of the soil pipe, and this operates to prevent the formation of gases, and keep all liability to trouble reduced to a minimum. Another feature upon Figure 10 to which I wish to call your attention is that of cellar floor and subsoil drainage. In a village town, an isolated dwelling that is situated high enough to have its cellar and subsoil drain flow out upon the surface of the ground, should never connect those drains with the sewerage system of the house or street. But such conditions are comparatively rare, and usually we are obliged to connect such drains with the sewer. It should be accomplished as shown in Figure 10, by a trap with a seal 8" or 10" deep at the least. A shallow seal trap is very liable to evaporate during a period of drouth in the summer or owing to furnace heat in the winter, and thereby permits the sewer gas to be laid on to the house.

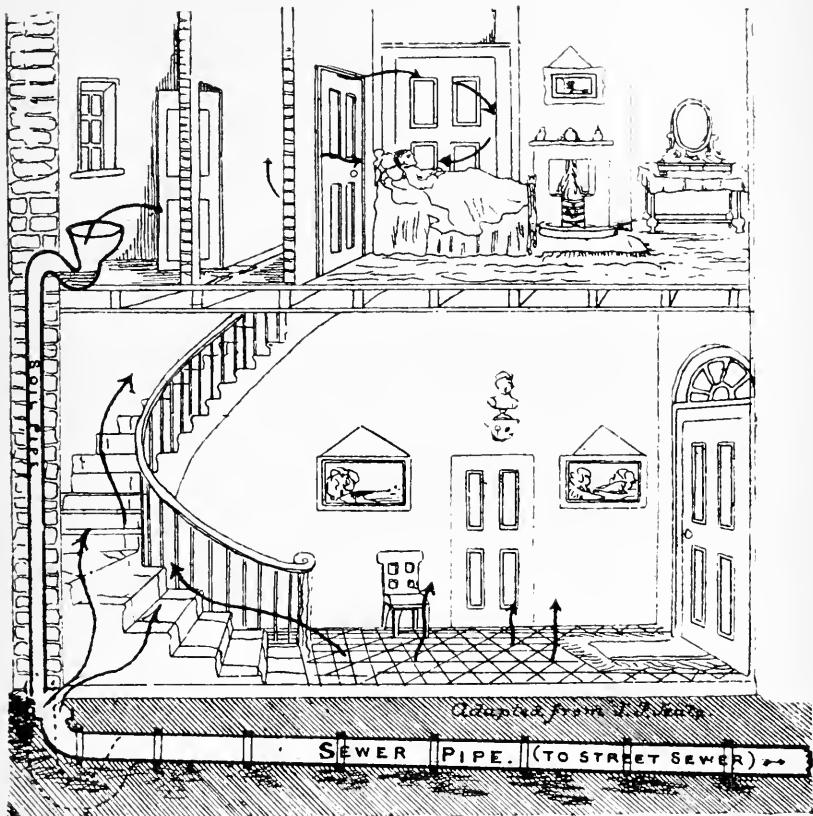


FIG. 11.

Figures 11 and 12 represent the class of defects (avoided in Figure 10) referred to above, namely :—

*First.* Leaky joints of short lengths of sewer pipe (not iron) under the basement floor.

*Second.* The not unusual bad or broken connection between the iron soil pipe and the sewer pipe in the niche in the wall.

*Third.* The passage of gas through the water seal of a W. C., when soil pipe is not extended through the roof.

(Under the *exact* conditions shown in Figure 11 there would not be much tendency in the gas to go through the seal of the W. C., because it is represented as escaping more readily elsewhere, but with better conditions below stairs a worse one would be above.)

*Fourth.* In Figure 12 sewer gas in the cellar owing to evaporation of water seal in a badly formed shallow trap.

The dotted lines under the cellar floor in Fig. 12, showing subsoil drainage and a deep seal trap, is the method suggested in remarks under Fig. 10, of avoiding the liability of illness incident to the presence of sewer-gas under the old and represented conditions.

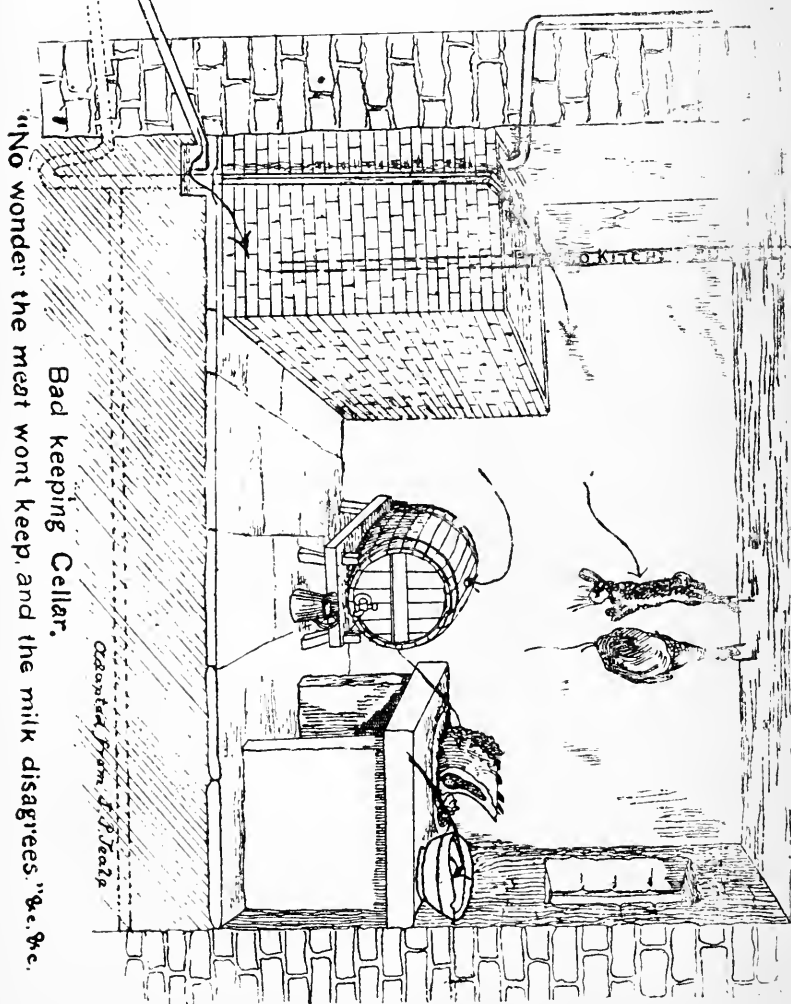


FIG. 12.

## PLUMBING FIXTURES.

The water-closet, the set wash bowl, bath-tubs and kitchen sinks, with their traps, constitute the principal fixtures in house plumbing, and their variety is very great. I have referred to only two of the

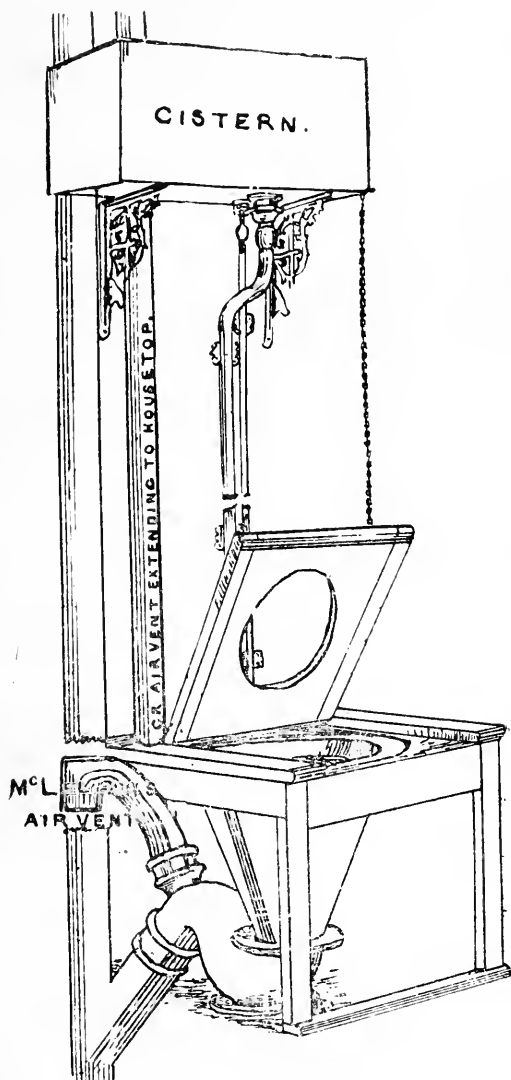


FIG. 13.

various water-closets and in both those cases to warn you against them, and of others I shall say but little. Only a few of them all

serve their purpose well, and among those I shall first mention the most economical, and secondly the most expensive fixtures. Figure 13 is a diagram intended to represent a class of flushing rim short hoppers set as they should be with as little boxing about them as possible. Incidentally it represents Tucker's cast iron, porcelain-lined hopper, as manufactured by J. L. Mott, N. Y.

This general form of hopper has several manufacturers and can also be obtained completely made of earthen ware. The flow of water should be such that it will drive before it all the soil and paper left in the hopper, and this cannot be done by the small stream from the direct service pipe, but is only properly accomplished by water from a special tank set directly over the hopper and six or eight feet above it, from which the water should flow through a large-sized ( $1\frac{1}{2}$  or  $1\frac{3}{4}$ ) pipe direct to the rim of the hopper. Aim to have the pipe with as little curvature in it as possible between tank and hopper, and insist upon the large size mentioned (when cistern is at the lesser height) and a large outlet valve in the tank. Such an arrangement is really the most economical in its use of water, from the fact that just the quantity necessary for water carriage is contributed in a manner to perform the labor of forcibly excavating the soil out of the hopper, while fifty times the amount contributed less abruptly may still fail to remove the soil from sight.

The hopper whose flushing rim is not formed so as to direct the water into the trap without spattering outside the bowl is badly formed. When I speak of the soil being removed from sight, I refer to its being carried beyond the trap and committed to the sewer.

There are certain water-closets of the short hopper variety, called washout closets, much used at the present time, because the method of flushing gives, to the sight at least, a cleanliness that is very acceptable. It is shown in section in Figure 14, and it belongs to a class the

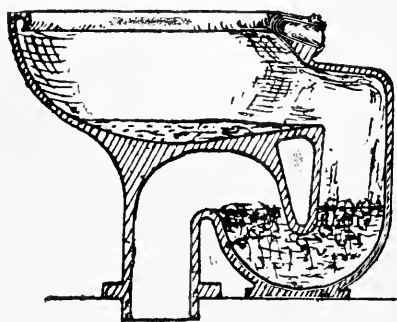


FIG. 14.

principal objection to which is, in my mind, this: that the concealed position of the trap prevents one from seeing at a glance, as in the case of the short hopper above referred to, whether the water seal against sewer gas is perfect or not, and whether or not the flush has carried the soil into the sewer or has left it in the

concealed trap, from which place as decomposition sets in, gases are given off. The failure to remove the soil in Figure 13 would be evident, and thus a motive for a second pull at the flushing chain is given.

There is one objection, that, to a certain extent, holds against *all* closets of the above forms, namely, the shallow depths of the water seal that is necessary in order to make the flush effective. The rush of water through the soil pipe from other closets adjacent or overhead creates a partial vacuum in the pipe, and tends to draw the water out of a shallow seal trap. I have in my bath room a water-closet that formerly when used, not infrequently destroyed the seal of an adjacent closet, wash-stand and bath-tub. This difficulty is met by venting the traps against syphonage, and may be accomplished in various ways. By reference to Figure 10 and to Figure 13 you will observe a 3" pipe extending from the crown of the trap of the lower closet to a point above the upper closet, where it enters the soil pipe, it is also one of the methods shown in Figure 13. Its office is to prevent syphonage of the lower trap when the upper closet sends a volley of

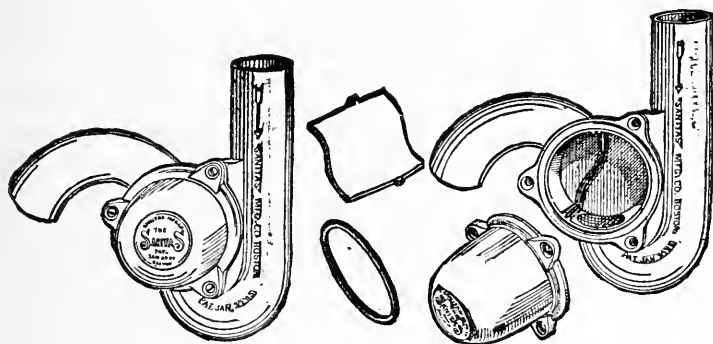


FIG. 15. "SANITAS" TRAP.

water past it, but it may be left to safely perform that office only when of large size and very direct and short. I have convinced myself by experiments of the insufficiency of back-venting traps through long lines of pipe and, after testing them under many actual and supposable conditions. I now, for the most part, place my trust in

the non-syphoning trap called the *Sanitas*, shown in Fig. 15, and in the common S traps with the McLellan air inlet applied to it, shown in detail in Figures 16, 17 and 18.

The *Sanitas* trap is practically an S trap with cup-like reservoir on one side, in which is a thin partial division wall with a curved surface. In resisting syphonage the water is arrested by being thrown up against the wall, and thence is reflected back to restore the seal after the air desired to fill the vacuum has passed on. It is practically non-syphoning and self-cleansing. The common S trap with McLellan air inlet on it is simply a method of stopping the syphonic action by supplying air to the vacuum under the edges of an inverted cup which normally rests in quick-silver, and which cup lifts or responds to the vacuum drag quicker than the water in the trap, simply

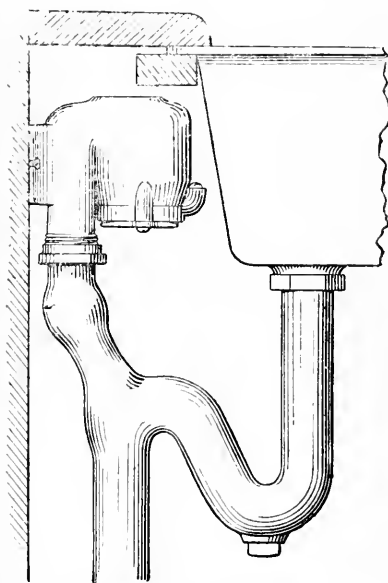


FIG. 16. McLELLAN AIR-INLET.

because it is lighter. The moment the cup has lifted and performed the office of letting enough fresh air in to destroy the vacuum pull, it falls back upon the quick-silver and prevents the sewer air from passing out. This air inlet is close by the trap which is to be protected, and it responds at once, while the friction upon a long line of vent-pipe extending from the trap to the top of the house, is an element in many cases not so easily overcome as the weight of the water in the trap; hence we frequently find traps robbed of their seal notwithstanding a vent-pipe of the same size as the trap, extends from them to the top of the house.



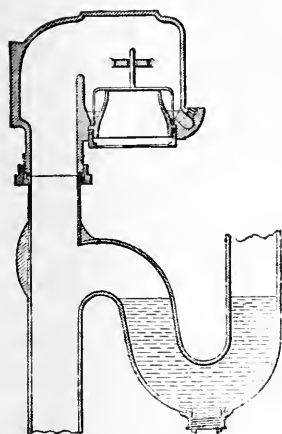


FIG. 17. VENT AT REST.

Fig. 16 shows the air inlet or vent applied. Fig. 17 is a sectional view showing the inverted cup at rest in quick-silver. Fig 18 shows the cup lifting and allowing air to pass under it in response to the draft or partial vacuum caused by the falling

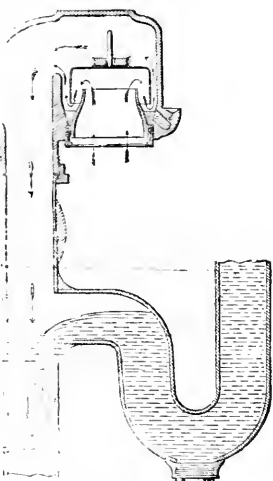


FIG. 18. VENT ADMITTING AIR.

water below or adjacent. I placed an air inlet upon the S trap of my washstand, which, though 10 feet from my water-closet had formerly lost its seal at nearly every discharge of the closet, and I was pleased to observe that in addition to preventing syphonage, it had another office of no inconsiderable value: namely, as a ventilator of the outfall pipe. By that office it extends the limit of distance from the main line of extended soil pipe, at which we can safely place a fixture; because the air that otherwise would be dead and objectionable in the unventilated branch from the main line, is largely replaced with fresh air every time a fixture is used. A larger size than that given in the cut is used upon the traps of water-closets, and one method of applying it may be seen in figure 13 where it is shown as taking the place of the long air pipe vent formerly in use.

The shallow seal of the prevailing types of short hoppers can, as I have implied, be protected quite thoroughly by proper venting against syphonage; yet the method is not at all times so sure as to warrant one in placing the trap where its failure cannot be noted by the most ordinary observation, and this is not the case in the general type of washout closets. Loss of seal by evaporation in a house closed for a

few weeks even is not unusual, and I have, during the past few years, remarked several failures in the upper closet of a house from wind pressure both up and down the soil pipe during the prevalence of strong gales. The fresh-air inlet is of but little value as a protection against this action when there are changes of direction in the soil pipe near the upper closets. The water is swayed or *rocked* out, if one may use the term, by a varying unequal pressure.

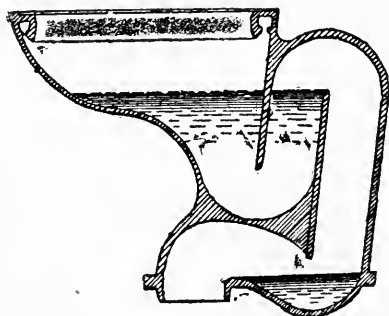
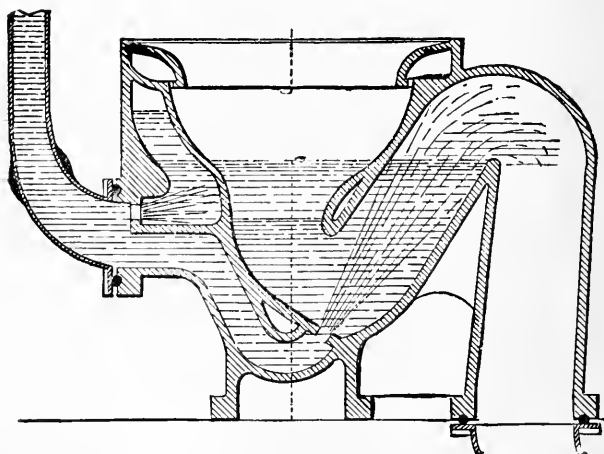


FIG. 19. THE DECECO.

Water closets that can successfully meet such conditions are of the expensive variety, though no more so than some others much in use that do not accomplish these same good results. Such closets belong to the *deep seal* class, and of course demand special means of emptying the bowl and trap. In this class are the Dececo, the Sanitas, and



THE "SANITAS" WATER-CLOSET.

FIG. 20.

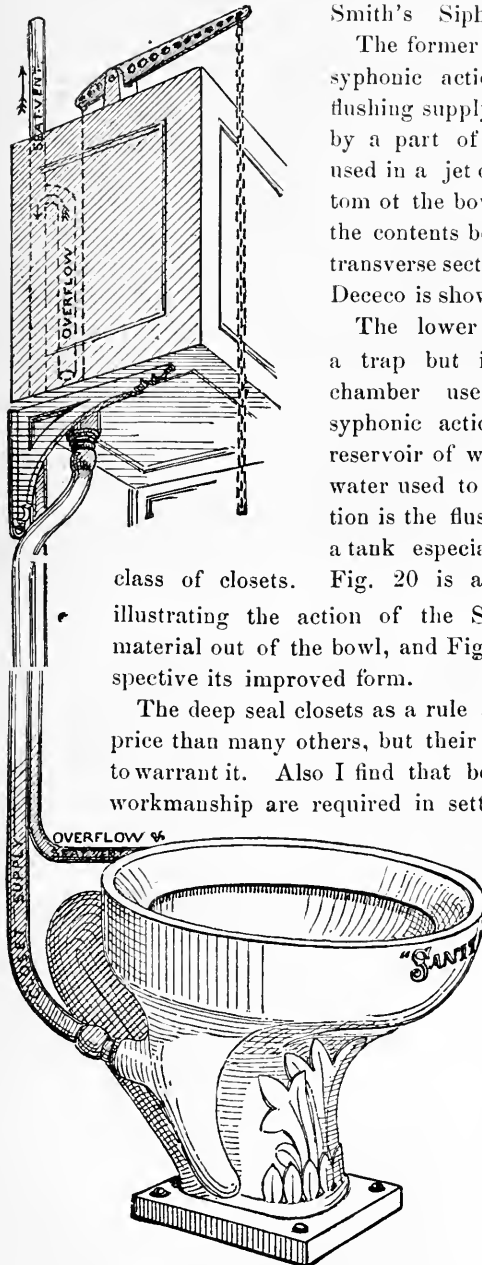


FIG. 21. THE "SANITAS" WATER-CLOSET.

Smith's Siphon Jet closets.

The former empties the bowl by syphonic action started by the flushing supply, and the two latter by a part of the supply being used in a jet of water at the bottom of the bowl to force or drive the contents beyond the trap. A transverse section of the improved Dececo is shown in Fig. 19.

The lower reservoir is not a trap but is simply a weir chamber used in establishing syphonic action with the large reservoir of water above it. The water used to start syphonic action is the flush contributed from a tank especially adapted to this class of closets. Fig. 20 is a transverse section illustrating the action of the Sanitas, in forcing material out of the bowl, and Fig. 21 shows in perspective its improved form.

The deep seal closets as a rule are held at a higher price than many others, but their great security seems to warrant it. Also I find that better workmen and workmanship are required in setting them, but the

standard is none too high. The deep seals accomplished by the Valve and Plunger closets, I have not mentioned, because they are fast disappearing from the market. They are expensive, complicated (hence often out of order) and unreliable.

## SET WASH STANDS, BATH TUBS AND SINKS.

The marked improvements in these fixtures, to which I would call your attention is in the *outlet*. The form almost entirely in use with us in the State of Maine, consists of a plug and chain for the bottom outlet, and an overflow outlet through perforations near the top edge of the fixture into a conduit that connects with the waste pipe below. The result is that the interstices of the link chain, and the walls of the overflow conduit, the former being difficult and the latter impossible to cleanse or flush properly, is stocked and coated with a film of filth. The wall of the overflow passage, soon becomes coated with the decaying soap slime, and throws off noxious gases into the room through the overflow holes, and is no small factor of unhealthfulness. These difficulties have been remedied by what is known as a standing overflow.

The standing overflow pipe is easily applied to the ordinary bath tub, but in new patterns it is placed in a recess at the end of the tub where there is no danger of its being kicked down. Its application to a wash bowl has brought about a change in the form of the bowl, *i. e.*, we can now have a bowl with outlet on one side where it presents no obstruction. The overflow pipe is easily removed, and its smooth surface readily cleansed; and indeed it presents less surface to become fouled than the links alone in the chain commonly used, which as we have before said are very difficult to clean. Fig. 22 shows one of the

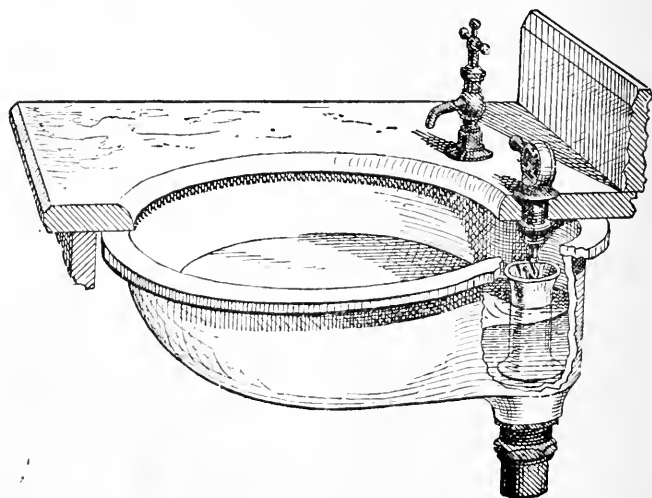


FIG. 22.

best forms of its application to a wash stand. Another improvement over the old is the increased size of outlet in such fixtures, whereby their whole contents are discharged in a few seconds, effecting a desired scouring of the trap and waste pipe below.

A peculiar phase of human nature is shown by the fact that many a householder seems to resent as a sort of personal grievance, having improvements in house sanitation pointed out to him. Many a man will eagerly seek and obtain the latest improvement in the machine with which he is manufacturing a certain article for the market, but a sewer gas trap or water closet that can give him a better security against sickness is ignored—the old ones are good enough. Improvement, however, will not halt because of such folly.

A good plumbing law in every city is a valuable adjunct in protecting an ignorant public, but perhaps the most effective factor in bringing about reforms has been the promulgation of some of the general principles that should control in house plumbing and drainage. The landlord now finds that the house hunter's first inquiry is in regard to sewerage and drainage. His assertion that the *unseen* system is all right does not carry conviction to the inquiring mind. The wise landlord will place his plumbing so that each running foot of it can be seen, and it will become its own sponsor, or else he should be obliged to furnish a certificate of its good condition from the hand of an independent expert in such matters. The claim for damages brought about by concealed sanitary defects are being listened to and granted in our courts of law, and as I have contended in a former article, I consider it equally as proper as the claim against the railroad corporation that takes me as a passenger, and by negligence does me injury.

My attempt has been to show what experience dictates to-day as the safest and best methods in sanitary science. To one who may wish to see what great advances have been made, and to judge from the practice of the past, how near certain principles to-day properly applied can be claimed as fundamental, I would suggest reference to a book which can be obtained in most public libraries, entitled "A Pictorial Guide to Sanitary Defects" by T. P. Teale, and to errors in "Plumbing and House Drainage Problems," reprinted from the Sanitary Engineer, and for the contrast to them, see the best practice of to-day in the recent works of William Paul Gerhard, C. E.

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I find in this State that a certain method has been pursued in extending the soil pipe through the roof, more extensively than I had supposed, about which a word of caution and instruction may be valuable. The common practice has been to extend the cast iron pipe with no hub on the top about a foot through the roof and then slip a piece of galvanized iron pipe over it with which the roof connection can be readily made. Ordinarily there is placed on it some objectionable patent cowl. The result that frequently occurs is as follows: During periods of extreme cold, the cowl gets clogged with snow and ice, and even the top part of the extended pipe gets filled with hoar frost, and the result is that the sewer gas failing to get out at the top forces itself into the house along the imperfect connection of the encasing galvanized iron pipe. I have frequently found sewer gas in a house from such an arrangement. A method that quite completely obviates the difficulty is as follows: Extend the iron pipe through the roof the necessary distance, leaving the hub at the top. Connect with roof by encasing with lead or heavy galvanized iron pipe of a size sufficient to slip over the hub; form the lead or build the galvanized iron into the hub, three quarters of an inch and then insert a piece of iron soil pipe say three inches long and make the ordinary tight lead joint. The galvanized iron connection into the hub should be made solid and not washed into the hub with the aid of the shears. The air space left by this method about the extended soil pipe limits the formation of hoar frost in it and more thoroughly if the air space is continued through the roof to the warm air in the rooms below.

# The Beneficent and Malignant Functions Of Micro-Organisms.

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By PERCY F. FRANKLAND, Ph.D., B.Sc., F. C. S., F. I. C.\*

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If Nature had provided us with eyes one thousand times as powerful as those with which we are at present obliged to be contented, we should form a very different idea of the living world around us. The living creatures, both plants and animals, with which we are now familiar, would fall into utter insignificance, as regards their number, by the side of the countless millions of diminutive living particles which would then come into view. These minute living forms would be seen to infest all our surroundings—floating in the air we breathe, swimming in the water we drink, and in full possession of every inch of the ground upon which we stand and walk.

But although the unaided eye cannot behold these wonders, the ingenuity of man has enabled us, with the assistance of the microscope, to discover this new world with its overwhelming multitudes of living beings.

## BACTERIA.

The minuteness of these living creatures, or micro-organisms, as we now generally term them, is so excessive, that their dimensions baffle description in the ordinary terms of measurement. Thus, without going by any means to the smallest known forms, we find as a common length of such organisms 1-20,000th of an inch, a figure which obviously conveys no definite impression with it. Perhaps it may assist comprehension to know that no less than 400 millions of these organisms could be spread over one square inch in a single layer. Thus we could have a population 100 times as great as that of London settled on an area of a single square inch, giving

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\*The Sanitary Record, Vol. IX, p. 451.

to each individual organism not three acres, which is supposed to be necessary for the individual man, but 1-400.000th of a square inch, which is quite adequate for a citizen in the commonwealth of micro-organisms.

The shape of these micro-organisms is generally very simple, thus some are merely more or less spherical granules, to which we give the name of *micrococci*. Others again, from their rod-like shape, are known as *bacilli*, whilst others having a cork-screw or spiral form are known as *spirilla*. All these various forms are sometimes loosely spoken of as *bacteria*.

#### YEASTS AND MOULDS.

In addition to these bacterial forms there are two other classes of micro-organisms—the saccharomycetes, or yeasts, and the moulds. The yeasts are comparatively large oval bodies, whilst the moulds consist of long threads, which give rise to well-known hairy patches which we are all so familiar with on articles of food, such as jam, bread and meat, which have been unduly exposed to air and moisture.

Of these variously shaped micro-organisms only the bacilli and spirilla are motile, whilst the micrococci, yeasts, and moulds are stationary, as are also many of the bacilli themselves. The movements executed by the motile bacilli and spirilla form one of the most fascinating and entertaining microscopic spectacles which exist. The rapid motion of the countless swarms of individuals following their sinuous paths across the field of the microscope in all directions and in the three dimensions of space, much after the fashion of a cloud of midges playing in the sunshine, produces an irresistible impression upon the observer that each individual microbe is assisting in and conscientiously performing its part in a highly complex and thoroughly organized polonaise conducted at express speed.

The process of reproduction amongst these micro-organisms is generally a very simple one. Thus the spherical micrococci merely become constricted by a waist, which, becoming narrower and narrower, results in the formation of two distinct bodies from one. The multiplication in the case of the bacilli is perfectly similar, the division taking place transversely to their length. In many cases, however, the bacilli are capable of another and highly important mode of multiplication. In the interior of the bacillus there appears a round or oval body having a very bright and shining lustre. This bead-like body is known as a *spore* and plays a most important part



in the propagation of many kinds of bacilli, for just as the seed is much more enduring than the plant from which it is derived, so these spores are capable of resisting many hardships which would be immediately fatal to the parent bacilli from which they have sprung. Thus these spores will endure the severest privations both of hunger and thirst; they are unaffected by cold far greater than that of an arctic winter, and will sometimes survive a few minutes' exposure to boiling water; in fact such spores are the hardiest forms of living matter which science has yet revealed.

Although it has been reserved for us in comparatively recent years to become acquainted with the size, form and habits of these micro-organisms, yet these micro-organisms and their works have been known from time immemorial, for when aggregated together in overwhelming numbers they give rise to appearances and produce effects which even the most casual observer, long before microscopes were invented, must have taken note of.

#### BACILLUS PRODIGIOSUS.

For passing over the larger micro-organisms—the moulds—with which nearly every child even is acquainted, I would call your attention to a small micro-organism, a bacillus not more than 1-20,000th of an inch in length, and which, notwithstanding its minuteness and insignificance *per se*, can yet when growing on suitable nourishing material, by combining the efforts of countless myriads, give rise to a pigment of an intensely blood-red color. This organism, which we now know by the name *bacillus prodigiosus*, has in the past doubtless been the cause of phenomena which at the time were regarded as being produced by a supernatural agency, for this bacillus prodigiosus finds a convenient soil for its growth and multiplication on bread and other farinaceous articles of food; thus it has not unfrequently taken up its abode on the sacred wafer and by there producing this marvelous color has given rise to the appearance of the bleeding host, which frequently figures in mediæval legends. Far more important, however, than these manifestations of color, to which some micro-organisms are capable of giving rise, are the works of utility upon which many other varieties are continually engaged without rest, day and night, and upon the fruit of which labours man is deeply dependent.

The essential work in the brewery, in the distillery, in the wine vat, in the cider cask, and even in the ginger beer bottle, is carried

on by labouring micro-organisms, whose particular handicraft consists in the production of alcohol. The artisans possessing this special skill belong to the yeast class. Although each individual labourer is by himself but an insignificant object, yet by combination they acquire sufficient power to produce the most startling effects. Thus it is by the united efforts of vast numbers of these yeast organisms that the liquid in the fermenting vat of the brewery boils up in great masses of froth and foam ; it is by their energy that the champagne-cork is discharged with the violence of a pistol-shot, while the much-prized alcohol which results from their labours constitutes one of the most important sources of revenue in this country.

But whilst one gang of microbes is labouring for man in the production of alcohol, another is engaged in further elaborating this alcohol into vinegar. The artisans skilled in this particular craft are much more minute than those who produce the alcohol : they are small bacilli, not more than 1-20,000th of an inch in length. It has, however, been recently found that vinegar can be more economically produced without the services of these organisms—viz., by distilling wood in the same way that coal is distilled in the manufacture of gas ; and doubtless this artificial vinegar will more and more take the place of the fermentation-vinegar.

Other microbes, again, are employed by the baker to make his bread rise ; these microbes also enjoyed a monopoly until the Aërated Bread Company introduced the mechanical process of raising the dough.

#### PUTREFACTION AND DECAY.

I could mention a large number of other works which are dependent upon the life of micro-organisms, but I will confine myself to mentioning perhaps the most important of all the changes which they are capable of effecting. I refer to the conversion of refuse organic matter, both animal and vegetable, into mineral matter. The well-known phenomena of putrefaction and decay to which all refuse vegetable and animal matter is subject, are now known to be entirely due to the action of various micro-organisms, and if due precautions be taken to exclude these micro-organisms, vegetable and animal substances are found to be almost quite permanent.

Therefore, but for the agency of these micro-organisms, the surface of the globe would be covered with the remains of plants and animals undergoing but little more change than the stones and other

mineral ingredients of which the earth's crust is composed. But under these circumstances life, as we now know it upon the surface of this planet, would soon come to an end, for it is by the decomposition of refuse animal and vegetable matter in the ground that the fertility of the soil is maintained, and in the absence of this decomposition, which, as I have said, can only be effected by the agency of micro-organisms, the most fertile land would soon become a barren waste incapable of supporting plant life, and upon the extinction of the latter the cessation of animal life would rapidly follow as a necessary consequence.

Thus whilst the animal is directly dependent upon the vegetable kingdom, the latter is directly dependent for its food upon the products elaborated by micro-organisms from refuse animal and vegetable matters; and if one link, although at first sight perhaps the least important one in the chain, be broken, the whole mechanism, with its wonderful cycle of changes, must necessarily collapse.

The properties of micro-organisms which we have hitherto considered have been harmless or even beneficial to man. There are, however, a number of varieties of microbes whose behaviour is anything but amiable, and whose dangerous character has brought such discredit upon the entire class of micro-organisms that the virtues of some are often overlooked and their usefulness forgotten, owing to the terror and dismay which their harmful brethren inspire. For, as is well known, some of these minute forms of life exist also as parasites on the higher organisms, including man himself. Of these higher organisms they frequently cause the degeneration and death, producing the severest diseases amongst animals high and low, and threatening mankind with the most murderous plagues and epidemics.

#### PATHOGENIC MICRO-ORGANISMS.

Those micro-organisms which are capable of producing disease are generally known as *pathogenic* ones, whilst the diseases to which they give rise are termed *zymotic* diseases, in consequence of their course presenting more or less resemblance to a process of fermentation. Thus the manner in which infectious diseases are communicated, the continuous propagation of the infectious principle through a long series of individuals, the occasional transportation of the infection to long distances—again, the period of incubation, and the typical manner in which these diseases run their course, are all cir-

circumstances which have long and irresistibly impressed observers with the organized nature of the exciting cause. In fact, although we are firmly convinced that all the zymotic diseases, such as cholera, scarlet fever, typhoid fever, measles, small-pox, diphtheria, hydrophobia, &c., are due to the presence of micro-organisms, yet it is in only comparatively few cases that particular micro-organisms have been conclusively proved to be the cause of a particular disease.

#### BACILLUS ANTHRACIS.

The disease which of all others has been most thoroughly studied in this respect is one of which we do not hear much in London, but which is well known in Bradford, as *wool-sorters' disease*, or malignant pustule, and which is much dreaded also by farmers, owing to the ravages which it makes amongst stock, the particular disease in cattle being known as *splenic fever*. This splenic fever in cattle, and wool-sorters' disease in man, are now known to be due to one and the same cause—viz., to the presence of an exceedingly beautiful but malignant organism termed the *bacillus anthracis*. These bacilli were first observed in the blood of animals which had died of splenic fever in the year 1863, and it was this discovery which gave the first impulse to the careful study of the zymotic diseases which in recent years has yielded such abundant fruit in the hands of Pasteur, Koch, Lister, and others.

It will be of interest to examine a little more in detail how this disease, which may be taken as typical of zymotic diseases, is communicable from animal to animal.

If the blood taken from any part of an animal just dead of anthrax be microscopically examined, it will be found to be teeming with these bacillar forms. Now, if the smallest quantity of such blood is introduced into the tissues of another animal capable of taking the disease, the inoculated animal becomes infected, and almost certainly succumbs; and if, now, the blood of this second victim be similarly examined, this also will be found teeming with the same bacilli. We thus see that the disease is accompanied by the enormous multiplication of the micro-organism within the system of the victim, and that the disease may be indefinitely communicated from one animal to another.

But we may also cause this bacillus to grow and multiply abundantly outside the animal system altogether, or, as we term it, 'cultivate the organism in an artificial medium.' Thus, if we take on

the point of a needle the minutest trace of the blood of an animal dead of splenic fever, and then introduce the point of the needle into any of the ordinary cultivating media, such as broth, geletine-peptone, agar-agar, or blood-serum, we shall obtain in the course of a few days an abundant growth of the anthrax-bacillus readily visible to the naked eye. I ought to mention that the appearance of the growths produced by micro-organisms on these artificial culture-media is often highly characteristic, and, by means of these naked-eye appearances, we can often differentiate between micro-organisms which under the microscope are indistinguishable.

Now, in these artificial culture-media the anthrax-bacillus develops those hardy durable forms which I have already said are known as spores, and with the appearance of these spores the capacity for doing harm is enormously increased, for, as I have already pointed out, these spores are highly indestructible, and are capable of retaining their vitality for practically an indefinite length of time. Now, it is this circumstance—that the anthrax-bacilli produce spores—which renders this disease so difficult of extermination. Thus, if the carcasses of animals dead of anthrax are buried or are allowed to decay upon the surface of the earth, the bacilli form spores in the soil, and healthy animals may thus become infected by taking in the spores with their food when grazing. Again, the skins of animals which have died of anthrax not unfrequently pass into commerce, and often prove fatal to the tanners and wool-sorters who handle them even long afterwards.

From this it will be seen how necessary it is that the strictest supervision should be exercised whenever an outbreak of splenic fever takes place, and that the disposal by cremation of the carcasses of the affected animals should be most vigorously enforced. Unfortunately those most closely concerned with this disease are only too often quite ignorant of its dangers. Thus, during a recent outbreak of splenic fever in a rural district of England, the butcher to whom the slaughtering of the affected animals was entrusted was quite unaware of the dangerous task upon which he was engaged, and only had his ignorance enlightened by himself falling a victim to the disease.

#### ERYSIPELAS.

We will now turn to another disease which is far more common in man than anthrax, but which, like anthrax, is also caused by a micro-organism, in this case a micrococcus, not a bacillus. The

micrococci of this disease—erysipelas—hang together in chains, and are hence known as *streptococci*. These organisms can be easily cultivated in artificial media outside the body, and there can be no doubt that they are the cause of the disease, for erysipelas has actually been produced in man by intentionally inoculating these cultivations of the streptococcus, with the result that typical erysipelas was produced. I should mention that these experiments upon human beings were performed not merely for the purpose of scientific inquiry, but also for the benefit of the persons inoculated, who were suffering from malignant tumors, which are sometimes alleviated by an attack of erysipelas. Owing to these experiments, therefore, we are able with confidence to affirm that this particular organism is not only capable of setting up erysipelas in animals but also in man.

#### TUBERCULOSIS.

But undoubtedly the greatest and most remarkable piece of work which has ever been accomplished in connecting disease with the life of micro-organisms, is the proof which has been furnished by Koch of the exciting cause of tuberculosis, one of the most familiar forms of which—pulmonary consumption—is the commonest disease in the world, and in this country the greatest enemy to human life, destroying, as it does, about one-fifth of our population generally in the best and most active years of existence. This disease, we now know with absolute certainty, is caused by a minute bacillus which is invariably found in all the varieties of tuberculous disease.

By the most ingenious methods this bacillus has been cultivated in artificial media outside the body, and whenever reintroduced into the system of an animal it again produces the characteristic disease. To give an idea of the thoroughness and conscientious exactitude with which such researches are conducted, I may mention that Koch's investigation on tuberculosis was not given to the world until he had proved his point by experiments made on 273 guinea-pigs, 105 rabbits, 44 field-mice, 28 white mice, 19 rats, 13 cats, besides numerous dogs, fowls, pigeons and other animals. The exact manner in which this disease is communicated from one individual to another has not been actually ascertained, but when it is borne in mind that the sputum of consumptive patients contains the organism, and that the bacillus is known to produce spores, it is not difficult to understand that there must be very numerous channels by which the poison may be conveyed. It would appear, however, that the mere convey-

ance of the organism from one person to another is not sufficient to induce the disease, but that more or less predisposition to the disease is also necessary. In the case of all the zymotic diseases predisposition no doubt plays an important part in the process of infection, but in the case of tuberculosis this factor of predisposition appears to be of more than usual importance.

The possibility of this disease being communicated from the lower animals to man must also be borne in mind, for tuberculosis is comparatively common amongst cattle, and, as in so many other infectious diseases, milk must be viewed with suspicion as a particularly suitable medium for the conveyance of the zymotic poison.

There are, again, certain zymotic diseases more especially peculiar to the lower animals, in which the connection with specific micro-organisms has been fully made out, as in the case of glanders, chicken cholera, and swine fever; but of more immediate importance to man is our acquaintance with the specific micro-organisms which induce the formation of abscesses and of suppuration generally, as well as of the organism causing the terrible phenomenon of lock-jaw or tetanus. These are the micro-organisms which have to be more especially taken into consideration in the practice of surgery, for it is to the presence of these organisms, far more than to anything else, that the dangers as well as the sufferings consequent on surgical operations are due.

#### ANTISEPTIC TREATMENT OF WOUNDS.

In consequence of our more intimate acquaintance with these microbes capable of setting up suppuration, and knowing as we now do how they may be destroyed by the action of a number of chemical agents, completely new precautions have been introduced into the practice of surgery with a view to destroying the microbes which may gain access to wounds and thus preventing the evil effects which result from their presence. This new departure in the practice of surgery is what is known as the *antiseptic treatment of wounds*, and Englishmen may be justly proud that this most important step towards getting the mastery over disease is due to Sir Joseph Lister, whose great discovery has been of the most priceless value in alleviating the sufferings of humanity in every quarter of the globe.

Two of the principal substances employed in the antiseptic treatment of wounds are corrosive sublimate and carbolic acid, whilst many others have from time to time been used to a less extent. In

applying these antiseptics it is necessary, of course, that they should be employed of such strength that, without poisoning the patient, they are still sufficiently strong to poison the microbes. Of all these substances, the most powerful as an antiseptic or germicide is corrosive sublimate, but it is, unfortunately, also extremely poisonous to man. In a sufficiently dilute state, however, it is largely used for a number of antiseptic purposes.

When we come to inquire how it is that some of these minute organisms are capable of producing these disastrous effects upon the animals in which they grow and multiply, we find that the virulent symptoms to which they give rise are not in all probability due to the mere presence of these living particles as such, but to the fact that they elaborate within the tissues of the body certain chemical substances of a highly poisonous nature, and that these poisons, and not the microbes themselves, are the real cause of the mischief. These poisonous chemical substances may be elaborated by microbes when growing in artificial cultures outside the body; thus, when meat and other albuminous substances begin to undergo decomposition, they are frequently possessed of most intensely poisonous properties. Everyone is familiar with those remarkable instances, of which we frequently read in the papers, of a whole family being poisoned by partaking of some particular dish of meat, fish, or the like. Now such cases are nearly invariably due to the food in question having been in an unsound condition; before being cooked this food has harboured certain micro-organisms which have produced these particular chemical substances, and whilst the microbes have been destroyed in the cooking, the poisonous character of these elaborated chemical substances has remained unchanged by the process.

#### PTOMAINES.

Several of these microbial poisons or *ptomaines* as we call them, owing to the presence of such substances having been first discovered in decomposing corpses, have already been isolated and obtained in a pure state; thus a substance which is produced by the tetanus-bacillus has been separated out from the culture materials in which this organism has grown, and this substance, on being introduced into animals, rapidly produces the same characteristic symptoms which are produced when the tetanus bacillus itself is inoculated, and has had time to multiply in the system and produce this particular poison.



It now remains to consider our relationship to those micro-organisms with which we are constantly surrounded both in the air we breathe and in the water we drink.

The modern methods of research enable us not only to ascertain the nature of the various micro-organisms existing in air and water, but also to estimate with a fair degree of accuracy the actual numbers in which they are present in these media.

#### MICRO-ORGANISMS IN THE ATMOSPHERE.

Without entering into a description of the methods employed, a detailed account of which will be found summed up in a lecture which I recently gave at the Society of Arts,\* I will briefly enumerate some of the more important results which I have obtained in the course of a systematic investigation of the aërial microbia.

When the subject first attracted the attention of experimenters it was very generally supposed that these micro-organisms were present everywhere and at all times in immense numbers, and that in fact it was absolutely impossible to elude them; this, however, has been shown to be by no means the case. If we go to the top of a high mountain, or if we ascend even the spires of some of our cathedrals, we shall find that they are present in exceedingly small numbers. Thus in two gallons of air examined on the top of Norwich Cathedral spire, a height of about 300 feet, we obtain only seven. In the lower regions of the atmosphere, and as we gradually approach the earth's surface—where, of course, the air is more or less laden with dust,—we find, on the contrary, an increasing number in the same volume of air. Thus on the same day, at the base of the Cathedral, eighteen were found. These results have been confirmed by numerous other experiments made on St. Paul's and elsewhere. It is further found that the microbial population of the air is enormously increased by any circumstances tending to disseminate dust, *e. g.* by the aggregation of a large number of people in a confined space. Thus in two gallons of air examined in the large hall of the Natural History Museum on an ordinary week day there were found fifty; but on a whit Monday, when crowds were visiting the building, as many as 280 micro-organisms were discovered in the same volume.

The tendency which these minute living particles have to subside in the absence of aërial disturbance, and the extreme ease with which

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\*Some of the Conditions affecting the Distribution of Micro-organisms in the Atmosphere.' *Journal of the Society of Arts*, No. 1,792. Vol. xxxv. 1887.

they can again become suspended in the air, teaches us what great care should be taken in the sick-room to avoid the stirring up of dust, for it is in consequence of the universal presence of these microbes and the facility with which they can gain access to wounds that the danger of surgical operations becomes so great.

In the summer months micro-organisms are more abundant than in the colder weather, and I have found that, starting from four in the standard two gallons of air in January, they rose to as many as 105 in August, and then gradually fell as the winter approached.

Many other interesting experiments might be cited showing the effect of external conditions on the prevalence of aerial microbes, but I must now pass on to a brief account of the circumstances which regulate their presence in water.

#### MICRO-ORGANISMS IN WATER.

In the first place, we find that different kinds of waters possess them in very different numbers. Thus the River Thames in its raw condition, before undergoing any treatment at the hands of the water companies, has on the average taken throughout an entire year as many as 20,000 micro-organisms in one cubic centimetre of water, which is equal to about twenty drops. The same water, after it has been in the hands of the water companies, and there submitted to storage and filtration, contains on delivery from the mains in the same number of drops an average of only 400.

It was formerly supposed that the sand-filtration as practised by the companies was of little, if any, use; but these experiments show that sand-filtration forms a very material protective measure against our infection by water-carried microbes. In the deep well water derived from the chalk it is usual to find only a very few micro-organisms. Thus, in the water obtained direct from the wells sunk into the chalk by the Kent Company, I have found an average of eighteen. If this result, which it must be remembered has been obtained from water which has undergone no *artificial* filtration, but is the raw and untreated water as we find it, be contrasted with that mentioned above—viz., 20,000, which is the average for river water—it is at once apparent what an enormous difference there is in the microbial condition of these waters.

In order, however, to render our safety from such organisms practically absolute, it is only necessary to have our drinking water boiled. Many persons have a prejudice against boiled water in consequence

of its flat and insipid taste ; but these undoubted defects may be easily remedied by passing the boiled water when cold through any ordinary household filter, which will impart to the water its original freshness and palatability.

In fact, nearly all the terror which micro-organisms are justly capable of inspiring melts away when we remember that we can effectively combat them by heat. Thus milk and water, each of which if infected with hurtful microbes is capable of doing so much mischief to mankind, can be rendered practically safe by merely subjecting them to the process of boiling. Indeed, it cannot be widely enough known that perhaps the two most effective private measures which can be taken in avoiding zymotic disease consist in boiling all our milk and all our drinking water. By insisting upon these simple operations being systematically carried out, every family can render itself independent of the purity of our public milk and water supplies, the safety and wholesomeness of which it is altogether beyond the power of the private individual to control.

I trust that the preceding short sketch of the life and habits of some of these micro-organisms will not have resulted in exciting any unnecessary alarm. I know that some people, and unfortunately a large number, feel that it is very undesirable to have any knowledge of such hidden dangers ; that, in fact, 'where ignorance is bliss 'tis folly to be wise.' I need hardly say that this proverb is utterly repugnant to all who have the progress of science at heart, for the true man of science prefers to have Truth above everything else, and is at all times ready to sacrifice the pleasure and to endure the pain which its attainment may entail. But there is another proverb, 'Knowledge is Power,' which is, I venture to think, far more applicable to the case of these micro-organisms ; for by acquiring an accurate knowledge of their habits of life we become endowed with the power to defeat the attacks of the injurious and malevolent as well as to avail ourselves of the labours of the useful, so as to guide their energies in the service of, and for the benefit of, mankind.

## GLOSSARY.

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This Report has been prepared for the benefit of all classes of persons in the State, and as far as possible it has been the wish to make its language as clear and intelligible as possible. A few technical terms, however, are so inseparably interwoven into the consideration of the subject of public hygiene that the avoidance of their use is impossible, and as it is desirable that the general public should become acquainted with their meaning, and especially to know in what sense they are used in the present work, this Glossary is introduced.

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**Ætiology.** [See Etiology.]

**Antiseptics.** Agents which prevent or retard putrefaction; or as now understood, those which prevent the development of pathogenic or fermentative organisms. Some of these which, in weaker solutions, act as antiseptics, in stronger solutions, being destructive of the life of the organisms, are also disinfectants.

**Bacilli.** The plural of bacillus.

**Bacillus.** One group of bacteria which are filiform, or consist of slender rods.

**Bacillus Anthracis.** The bacillus of anthrax, the essential cause of the disease.

**Bacteria.** Unicellular Organisms, microscopic in size, on the border land between the vegetable and the animal kingdom, but now regarded as pertaining to the former.

**Bacterium.** The singular of bacteria.

**Biology.** The science of life.

**Bovine Virus.** Vaccine virus taken directly from the calf or heifer.

**Contagion.** The specific cause of certain diseases by means of which they may be transmitted. Also applied to the act of transmission of communicable diseases.

**Contagious.** Capable of being transmitted by contagion; communicable; infectious. But little effort has been made in this Report to discriminate between the meaning of Contagious and Infectious; although their derivation and original application were different, most of the later medical writers of Europe and America use the two words interchangeably. This, at least in works for popular use, is the less confusing way.

**Deodorants.** Substances which destroy offensive smells. Some, but not all deodorants, are also disinfectants. [See Disinfectants.]

**Desquamation.** The shedding of the outer skin, usually in scales, after scarlatina and some other diseases.

**Diagnosis.** The determination of the character of a disease.

**Disease Germs.** Bacteria; micro-organisms whose reception into the system and multiplication in it, produce the contagious diseases.

**Disinfectants.** Agents or substances by means of which the contagion of diseases may be destroyed. Often improperly applied to substances which, though useful as deodorants or antiseptics, are nearly or quite valueless as germicides.

**Endemic.** Applied to diseases which prevail in particular localities or districts, and which are due to local conditions or causes.

**Epidemic.** Common to, or affecting many people at the same time; generally prevailing. The causes of epidemics were formerly very generally regarded as depending upon an "epidemic constitution of the atmosphere," but of this there has never been collected any satisfactory proof. The more we study epidemiology the more we are led to look to contagion and the laws which govern its diffusion for an explanation of the occurrence of epidemics.

**Epizootic.** Applied to the diseases of animals in the same sense as epidemic is used with reference to human diseases; affecting many animals at the same time.

**Etiology.** The causation of diseases.

**Exogenous.** Produced or generated outside the system.

**Exotic.** Foreign; a disease introduced from some other country.

**Fission.** Division; the common method of multiplication with many of the lowest organisms.

**Fomites.** Substances or articles which are liable to carry the contagion of diseases.

**Germicides.** Destroyers of germs; disinfectants.

**House-drain.** That part of the house-drainage system which carries the wastes from the soil-pipe and waste-pipe to the sewer.

**Humanized Virus.** Vaccine virus taken from the cow-pox vesicle which has been produced on the human arm, usually the arm of a child.

**Hygiene.** The science and art relating to the preservation of health.

**Infection.** Contagion; the specific cause of communicable diseases, now known in some diseases, and supposed in others, to be a microscopic organism.

**Infectious.** Communicable as a disease; contagious. [See Contagious.]

**Microbe.** Bacterium; micro-organism.

**Micrococcus.** A genus of the bacteria, consisting of very small, globular or oval, organisms.

**Pathogenic.** Generative, or productive of disease.

**Pathological.** Pertaining to pathology; diseased.

**Pathology.** The knowledge of diseases.

**Phthisis.** Consumption; pulmonary tuberculosis.

**Physiology.** The science which treats of the functions of living animals or plants.

- Prognosis.** The prediction, from the present symptoms of a disease, of its future course or termination.
- Quarantine.** The enforced isolation of persons and things coming either by sea or land from places where contagious diseases exist.
- Sewage.** The liquid and other filth conveyed in sewers.
- Sewer.** A drain for conveying dirty water and filth.
- Sewerage.** A system of sewers.
- Soil-pipe.** The pipe which conveys excreta from water-closets and urinals.
- Sporadic.** Applied to diseases, it means occurring in single or scattered cases, as opposed to epidemic or endemic, in which numbers or many are affected.
- Spores.** Minute grains or bodies which are formed within many of the lower flowerless plants, and which perform the function of seeds. The microscopic one-celled plants which we call bacteria multiply by fission, and in addition to this, some of them multiply by means of spores.
- Sporification.** The formation of spores.
- Tellural.** Pertaining to, or proceeding from, the earth.
- Trap.** An arrangement on some part of the sewerage system, usually a bend in the pipe in which water stands, by means of which we seek to prevent the return of gases and disease germs into the building.
- Tuberculosis.** A specific disease usually characterized by the formation of tubercles. Pulmonary consumption is the result of tuberculosis of the lungs.
- Typhoid Fever.** Meaning literally a fever resembling typhus. The common fever of this country. Formerly typhus fever and typhoid were not distinguished, the one from the other. Typhoid fever is communicable only in a slight degree, if at all, by direct contagion; but there is great danger of its spread from the sick to the well from defective sanitary arrangements and regulations.
- Typhus Fever.** A dangerously contagious disease rarely found in this country, and when appearing in our State, probably always by importation. [See Typhoid Fever.]
- Vaccination.** Inoculation with the virus of cow-pox.
- Vaccine Virus.** The infective material from the cow-pox vesicle used in vaccination.
- Variola.** Small-pox
- Varioloid.** Small-pox modified by vaccination. It is contagious, and as severe cases of small-pox may arise from exposure to its infection as from unmodified small-pox.
- Waste-Pipe.** That part of the house-drainage system which conveys the waste-water from sinks, baths, etc.
- Zymotic.** Characterized by fermentation. Applied to epidemic, endemic and contagious diseases, on account of the similarity between the process of fermentation and that which is started in the organism after its infection with the cause of any of these diseases.

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